FSB FINANCIAL STABILITY BOARD

Global Monitoring Report on Non-Bank Financial Intermediation 2018

4 February 2019

The Financial Stability Board (FSB) is established to coordinate at the international level the work of national financial authorities and international standard-setting bodies in order to develop and promote the implementation of effective regulatory, supervisory and other financial sector policies. Its mandate is set out in the FSB Charter, which governs the policymaking and related activities of the FSB. These activities, including any decisions reached in their context, shall not be binding or give rise to any legal rights or obligations under the FSB's Articles of Association.

Contacting the Financial Stability Board

Sign up for e-mail alerts: www.fsb.org/emailalert
Follow the FSB on Twitter: @FinStbBoard
E-mail the FSB at: fsb@fsb.org

TABLE OF CONTENTS

Executive summary

Non-bank financing is a valuable alternative to bank financing for many firms and households, fostering competition in the supply of financing and supporting economic activity. However, non-bank financing may also become a source of systemic risk, both directly and through its interconnectedness with the banking system, if it involves activities that are typically performed by banks, such as maturity/liquidity transformation and the creation of leverage.

To assess global trends and risks in non-bank financial intermediation, the Financial Stability Board (FSB) has been conducting an annual monitoring exercise since 2011. With the 2018 Report, the FSB moves away from the term "shadow banking" and adopts "non-bank financial intermediation" (hereafter NBFI), to emphasise the forward-looking aspect of the FSB's work. This change in terminology does not affect either the substance or the coverage of the monitoring exercise.

This Report presents the results of the FSB's eighth annual monitoring exercise. It covers data up to end-2017 from 29 jurisdictions, which together represent over 80% of global GDP.[1] As in previous years, this Report compares the size and trends of financial sectors in aggregate and across jurisdictions based primarily on sectoral balance sheet data.

The Report then focuses on those parts of NBFI that may pose bank-like financial stability risks (hereafter the "narrow measure"). Non-bank financial entities are included in the narrow measure if they perform one of the FSB's five economic functions (see Section 4). This assessment is conducted on a conservative basis,[2] reflecting the assumption that policy measures or risk management tools are not exercised (ie on a pre-mitigant basis). The key terms used throughout this Report are defined in Box 0-1.

The main observations are as follows:[3]

- **The monitoring universe of non-bank financial intermediation (MUNFI) grew by 7.0% to an aggregate $184.3 trillion in 2017**. MUNFI's share of total global financial assets increased for the sixth consecutive year (reaching 48.2%).
- **The assets of other financial intermediaries (OFIs),** which includes all financial institutions that are not central banks, banks, insurance corporations, pension funds, public financial institutions or financial auxiliaries, **grew by 7.6% to $116.6 trillion globally in 2017**. OFI assets grew faster than the assets of banks, insurance

---

1 Depending on the context, two samples are presented in this Report. The first sample comprises 21 individual non-euro area jurisdictions and the euro area as a whole. For more detailed assessments using granular data, the second sample comprises 29 reporting jurisdictions (for details, see Section 1).

2 Non-bank financial entities are only excluded from the narrow measure if data are available and the analysis of the data in accordance with the FSB's classification guidance provides sufficient grounds for exclusion. As a result, the narrow measure may overestimate the degree to which non-bank financial intermediation may give rise to financial stability risks. For details, see Section 4.

3 Measures of growth throughout the Report are adjusted for some exchange rate effects by applying a constant end-2017 exchange rate across all past years to convert data denominated in local currencies into US dollars. "Assets" refer to financial assets on an unconsolidated basis, where available. Due to improvements in national statistics and more granular reporting, these results are not strictly comparable to those presented in previous Reports.

corporations and pension funds. OFI assets represent 30.5% of total global financial assets, the largest share OFIs have had on record.

- **Investment funds continue to be the largest OFI sub-sector, followed by captive financial institutions and money lenders (CFIMLs).**
- **Structured finance vehicles (SFVs) grew in 2017 for the first time since the 2007-09 global financial crisis**. While SFVs grew in most jurisdictions, the global increase was driven by just a few jurisdictions.
- **Aggregate loans extended by OFIs increased by 0.2% in 2017, continuing growth seen since 2011** (in comparison, bank lending grew by 6.2% in 2017). OFI lending grew in some Asian jurisdictions, offsetting declines in some euro area jurisdictions.
- **OFIs have continued to reduce their reliance on wholesale funding and repos as a source of funding,[4] while that of banks has changed little since 2011.** The total repo assets of banks and OFIs grew by 9.6% in 2017 to reach $9.4 trillion, while their total repo liabilities grew by 9.8% to reach $9.2 trillion. Among OFIs, money market funds (MMFs), trust companies and investment funds are net providers of cash through repos, while broker-dealers are net recipients.
- **In aggregate, banks and OFIs have become marginally more interconnected through credit and funding relationships in 2017, remaining around 2003-06 levels.** Investment funds and MMFs are the largest OFI sub-sectors that provide credit to banks. OFIs have significant cross-border linkages relative to their assets.
- **The *narrow measure* of NBFI grew by 8.5%, to $51.6 trillion in 2017**, slightly below the 2011-16 average annual growth rate of 8.8%**.** Since 2011, the Cayman Islands, China, Ireland and Luxembourg have together accounted for over two-thirds of the narrow measure's dollar value increase. In the years since the financial crisis, growth of the narrow measure has been driven primarily by investment funds, as opposed to pre-crisis growth, which was driven to a large degree by entity types such as SFVs and other off-balance sheet funding vehicles (or conduits). The narrow measure represents 27.9% of MUNFI and 13.7% of total global financial assets (Exhibit 0-1 illustrates this relationship). Nearly three-quarters of the narrow measure is concentrated in six jurisdictions. Within the narrow measure, financial intermediaries are categorised into five economic functions (EF):
  - **Collective investment vehicles (CIVs) with features that make them susceptible to runs (EF1) grew by 9.1% in 2017**, less than in 2016 (9.9%) or from 2011-16 (13.2%). EF1 entities include open-ended fixed income funds, credit hedge funds and MMFs, and their assets represent 71.2% of the narrow measure (see Exhibit 0-1). CIVs in EF1 invest mostly in credit assets (eg for fixed income funds and MMFs, reflecting their business models) and are involved in liquidity transformation.
  - **Non-bank financial entities engaging in loan provision that is dependent on short-term funding (EF2) grew by 5.8% in 2017**, to account for 6.7% of the narrow measure. Finance companies, the entity type most commonly classified

[4] That is, the use of wholesale funding, including repos as a percentage of total balance sheet assets.

into EF2, employ a somewhat elevated degree of leverage and, in some jurisdictions, a high degree of maturity transformation. Finance companies in a few jurisdictions displayed high liquidity transformation.

- **Market intermediaries that depend on short-term funding or secured funding of client assets (EF3) grew by 5.2%**, to make up 8.2% of the narrow measure. Broker-dealers constitute the largest EF3 entity type. Reflecting their business models, broker-dealers in some jurisdictions continue to employ significant leverage, particularly when accounting for off-balance sheet exposures, although it is considered to be lower than the levels seen prior to the financial crisis. Net repo market funding of broker-dealers increased in 2017, after several years of reduced repo market funding.
- Entities involved in **the facilitation of credit creation (EF4), such as financial guarantors and credit insurers, grew by 4.4% in 2017**, although their current size ($173.4 billion) is likely quite understated due to the difficulty in capturing their off-balance sheet exposures. Risk data were also sparse.
- Finally, **securitisation-based credit intermediation (EF5) increased by 9.1% in 2017**, to account for 9.6% of the narrow measure, primarily driven by growth in trust company assets and securitisations.

In addition to assessing the data collected annually, experts from participating authorities also discuss various types of non-bank financial entities and activities in greater detail. This Report presents some results of these discussions as collaborative case studies (Section 5): (i) FinTech credit: data, classification and policies; (ii) recent developments in leveraged loan markets and the role of non-bank financial intermediaries; (iii) the non-bank credit cycle; (iv) cross-border co-movement of NBFI systems; and (v) the use of credit default swaps by non-bank financial institutions in the European Union (EU).

The 2018 monitoring exercise benefited from a number of improvements in data consistency and comprehensiveness.[5] These include enhanced data collection for wholesale funding, including repo activities, the total liabilities of entities, as well as for interconnectedness with the rest of the world. Risk metrics data were also enhanced by collecting data covering two consecutive years (2016 and 2017) and on risk concentrations. In addition to these efforts, participating jurisdictions also provided additional or improved data on credit, lending and interconnectedness in particular. The FSB plans to assess the effectiveness of these improvements and make adjustments as needed to further improve its understanding of NBFI and associated bank-like financial stability risks.

[5] Many of these were in response to the recommendations to strengthen the monitoring and data collection framework in FSB (2017c).

Key terms *Box 0-1*

The following monitoring aggregates are referred to throughout the Report:

(i) **MUNFI** (monitoring universe of non-bank financial intermediation), also referred to as non-bank financial intermediation, is a broad measure of all NBFI, comprising insurance corporations, pension funds, OFIs and financial auxiliaries.

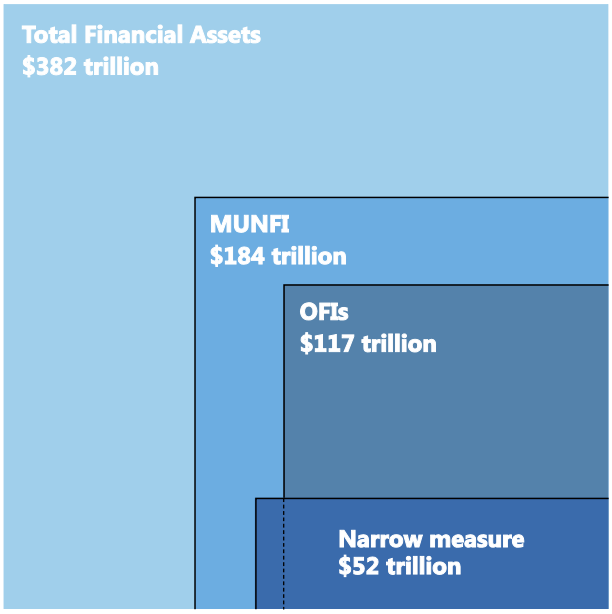
(ii) **OFIs** comprise all financial institutions that are not central banks, banks, insurance corporations, pension funds, public financial institutions or financial auxiliaries. The largest OFI sub-sectors are investment funds, CFIMLs and broker-dealers.

(iii) **Narrow measure of non-bank financial intermediation** (or "narrow measure") includes non-bank financial entity types that authorities have assessed as being involved in credit intermediation activities that may pose bank-like financial stability risks, based on the FSB's methodology and classification guidance.

Monitoring aggregates

At end-2017 Exhibit 0-1

Narrowing down[1]



Composition of the narrow measure[2]

Economic Functions	Size (USD trillion)	Share (%)	Change in 2017[3] (%)
EF1 (*collective investment vehicles with features that make them susceptible to runs*)	36.7	71.2	9.1
EF2 (*lending dependent on short-term funding*)	3.5	6.7	5.8
EF3 (*market intermediation dependent on short-term funding*)	4.2	8.2	5.2
EF4 (*facilitation of credit intermediation*)	0.2	0.3	4.4
EF5 (*securitisation-based credit intermediation*)	5.0	9.6	9.1
Unallocated	2.0	4.0	9.7
Total	**51.6**	**100**	**8.5**

[1] Total financial assets, MUNFI and OFIs are based on the 21+EA-Group, due to its broader sample. The narrow measure is based on data from the *29-Group*, as the data from eight participating euro area jurisdictions are more granular than the aggregate euro area data from the European Central Bank (ECB). For the *29-Group*, the corresponding aggregates are: total global financial assets ($377.8 trillion); MUNFI ($185.0 trillion); and OFIs ($117.0 trillion). [2] For additional details on these categories, please see Section 4. [3] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). Net of prudential consolidation into banking groups.

Source: Jurisdictions' 2018 submissions (national sector balance sheet and other data); FSB calculations.

1. Introduction

Non-bank financing provides a valuable alternative to bank financing for many firms and households, fostering competition in the supply of financing and supporting economic activity. However, the growth of non-bank financial intermediation (NBFI) may also give rise to financial vulnerabilities.

The comprehensive monitoring of global trends, innovations, adaptations and risks of NBFI is a key part of the FSB's efforts to enhance financial system resilience. To this end, the FSB conducts an annual monitoring exercise to: (i) assess global trends and risks in NBFI; and (ii) identify financial entity types or activities for which size or rapid growth, in combination with heightened risks, may call for an assessment of existing regulation by the relevant authorities. The monitoring exercise also helps authorities deepen their understanding of NBFI and identify areas for further improvements in data availability and analysis, and it provides authorities with a unique opportunity for sharing information and experiences.

This Report reflects the FSB's recent decision to move away from the term "shadow banking" (see Box 1-1). The term "non-bank financial intermediation", or NBFI, will be used in this and future Reports. This terminology change does not affect either the substance or the coverage of the monitoring exercise.

The monitoring exercise is conducted by the FSB's Non-bank Monitoring Experts Group (the "Experts Group"), which was established in 2016 under the Standing Committee on Assessment of Vulnerabilities (SCAV). The Experts Group includes representatives from all participating jurisdictions (see Exhibit 1-1), as well as standard-setting bodies and international organisations.[6]

The monitoring exercise is based on data submitted by jurisdictions up to end-2017 using sectoral balance sheet data from national financial accounts statistics (ie "Flow of Funds"), complemented with supervisory and other publicly available data where sectoral balance sheet statistics are not available in the required granularity.[7] As part of the forward-looking aspect of the monitoring exercise, members also provide details on recent innovations in their jurisdictions that relate to NBFI (Box 1-2).

The monitoring exercise adopts a practical two-step approach.[8] First, it takes a comprehensive look at NBFI to ensure that data gathering and surveillance cover all NBFI areas where risks to the financial system might potentially arise. The second step focuses

---

[6] These standard-setting bodies and international organisations are: the Bank for International Settlements (BIS), European Commission (EC), European Securities and Markets Authority (ESMA), European Systemic Risk Board (ESRB), International Association of Insurance Supervisors (IAIS), International Monetary Fund (IMF), International Organization of Securities Commissions (IOSCO) and the Organisation for Economic Co-operation and Development (OECD).

[7] The FSB uses sectoral balance sheet statistics as these are widely available and provide generally consistent financial sector data for mapping the global size and trends of NBFI. Some jurisdictions that currently lack sectoral balance sheet statistics have used other data sources which may not be fully consistent with the data from other participating jurisdictions. Jurisdictions that are already using sectoral balance sheet statistics are encouraged to further improve their granularity, where needed, while those that have not yet implemented official sectoral balance sheet statistics are encouraged to develop them.

[8] The practical two-step approach in this Report is based on the monitoring framework to assess bank-like financial stability risks from NBFI as set out in FSB (2011).

on the subset of NBFI with increased potential for systemic risk, and/or regulatory arbitrage.[9] To arrive at this narrow measure of NBFI, the exercise classifies a subset of entities based on economic functions (or activities) that involve bank-like financial stability risks (ie credit intermediation that involves maturity/liquidity transformation, leverage or imperfect credit risk transfer).[10]

Change in terminology **Box 1-1**

In response to the G20 Leaders' request to develop recommendations to strengthen oversight and regulation of shadow banking in November 2010, the FSB defined shadow banking as "credit intermediation involving entities and activities (fully or partly) outside of the regular banking system" and adopted a two-pronged strategy to address financial stability risks from shadow banking, including a system-wide oversight framework and the coordination and development of policies to address such risks.[11]

On 22 October 2018, the FSB announced its decision to replace the term "shadow banking" with the term "non-bank financial intermediation" in future communications.[12] This change in terminology is intended to emphasise the forward-looking aspect of the FSB's work to enhance the resilience of non-bank financial intermediation and clarify the use of the technical terms.

The change in terminology does not affect the substance or coverage of this Report. Moreover, the change in terminology does not affect the substance or coverage of the agreed monitoring framework and policy recommendations, which aim to address bank-like financial stability risks arising from non-bank financial intermediation (ie maturity/liquidity transformation, leverage and/or imperfect credit risk transfer). The FSB's work to transform shadow banking into resilient market-based finance will now be referred to as its work to enhance the resilience of non-bank financial intermediation.

The inclusion of non-bank financial entities or activities in the narrow measure is based on a conservative (ie inclusive) assessment of the risks such entities or activities may pose, especially during stressed events, on a pre-mitigant basis (reflecting an assumption that policy measures and/or risk management tools are not exercised). This pre-mitigant assessment allows authorities to then assess existing policy tools to address bank-like financial stability risks from NBFI and identify any residual risks or regulatory gaps that may warrant policy responses. The inclusion of non-bank financial entities or activities does not constitute a judgement that policy measures applied to address the financial stability risks of these entities and activities are inadequate or ineffective, nor does it necessarily reflect a judgement that there is regulatory arbitrage. This approach also helps improve the consistency in the assessment of NBFI across jurisdictions and capture potential changes in risks from NBFI. As a result, the narrow measure may overestimate the degree to which

[9] See FSB (2011).

[10] The focus on economic functions is based on an approach that was introduced in the FSB's high-level *Policy Framework for Strengthening Oversight and Regulation of Shadow Banking Entities* (hereafter the FSB Policy Framework), published in 2013. See FSB (2013b).

[11] For details, see FSB (2017c).

[12] FSB (2018d).

NBFI currently gives rise to post-mitigant financial stability risks.[13]

The FSB improves the monitoring exercise on an ongoing basis by deepening its analysis and learning from the experiences of previous exercises. For the 2018 monitoring exercise, additional data were collected in a number of areas as part of implementing the recommendations made in the FSB report, *Assessment of shadow banking activities, risks and the adequacy of post-crisis policy tools to address financial stability concerns*, prepared for the July 2017 Hamburg G20 Summit, including on repo assets and liabilities, total liabilities and interconnectedness.[14] Separately, data definitions in the reporting templates were improved to enhance the consistency of data submitted and the assessments made by jurisdictions.[15]

In order to maximise both the scope and granularity of available data, the monitoring results are presented for two different samples of jurisdictions, which differ in terms of the treatment of euro area jurisdictions.[16] The first sample, denoted *29-Group*, comprises 29 individual jurisdictions and has better granularity of non-bank financial sectors. The second sample, denoted as *21+EA-Group*, is more comprehensive in terms of jurisdictional coverage because it not only comprises 21 individual non-euro area jurisdictions, but also the 19-member euro area as a whole, as opposed to only eight euro area jurisdictions in the *29-Group*.[17] As in previous Reports, the first sample is used primarily in this Report due to its greater granularity, except for parts of Sections 2 and 3, where the *21+EA-Group* is equally granular but provides wider jurisdictional coverage.

Data sample composition — Exhibit 1-1

Belgium (BE)*	Argentina (AR)**	Hong Kong (HK)*	Saudi Arabia (SA)**	Euro area (EA)*
France (FR)*	Australia (AU)*	Indonesia (ID)**	Singapore (SG)*	
Germany (DE)*	Brazil (BR)**	India (IN)**	South Africa (ZA)**	
Ireland (IE)*	Canada (CA)*	Japan (JP)*	Switzerland (CH)*	
Italy (IT)*	Cayman Islands (KY)*	Korea (KR)*	Turkey (TR)**	
Luxembourg (LU)*	Chile (CL)**	Mexico (MX)**	United Kingdom (UK)*	
Netherlands (NL)*	China (CN)**	Russia (RU)**	United States (US)*	
Spain (ES)*				

= 29-Group *= 21+EA-Group* **= Advanced economy* ***= Emerging market economy (EME)*

[13] For example, although MMFs and fixed income funds are included in the narrow measure, their existing policy measures or risk management tools may have addressed or significantly reduced financial stability risks, including maturity/liquidity mismatches, imperfect credit risk transfer and leverage, so that additional policy responses may not be currently warranted.

[14] See FSB (2017c).

[15] Achieving consistency in the economic function (EF) classification framework is an iterative process. The guidance developed and used by jurisdictions on how to classify entities into EFs (classification guidance) may be refined each year to reflect improvements in data availability, assessment of non-bank financial entities' involvement in the different EFs, and financial market developments such as the emergence of new entity types or risks.

[16] The geographical scope of the monitoring exercise may be broadened in the future to include additional jurisdictions. Relatedly, the FSB Regional Consultative Group for the Americas (RCGA) has been conducting its own regional shadow banking monitoring exercise since 2012, using the FSB's monitoring approach.

[17] Euro area aggregated data are provided by the European Central Bank (ECB). The euro area jurisdictions are Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia and Spain.

Measures of growth and results throughout this Report are based on either annual historical data covering end-2002 to end-2017 or cross-sectional data as of end-2017. Due to improvements in national statistics and more granular reporting, the results in this Report are not strictly comparable to those presented in previous Reports.

The focus of this Report is mainly on trends since 2011, reflecting the improved quality of recent data.[18] Some exchange rate effects have been corrected for when presenting growth rates by applying a constant end-2017 exchange rate across all past years to convert each jurisdiction's local currency data into US dollars. Growth rates have not been otherwise adjusted (eg for the appreciation or depreciation of asset prices).[19]

The rest of this Report is organised as follows. Section 2 presents a comparative macro-mapping perspective of all sectors in the financial system, including central banks, banks, public financial institutions, insurance corporations, pension funds, OFIs and financial auxiliaries.[20] Section 3 provides an assessment of the interconnectedness between non-bank financial entities and banks, and also among non-bank financial entities as well as cross-border linkages. Section 4 discusses the narrow measure (based on the economic functions in which certain non-bank financial entities are involved) and the potential bank-like risks posed to financial stability. Section 5 provides a series of collaborative case studies that discuss certain types of non-bank financial entities and activities in greater detail.

Recent innovations in NBFI **Box 1-2**

As a part of the forward-looking aspect of its annual monitoring exercise, the FSB collects information on recent innovations from participating jurisdictions. This information is shared among jurisdictions, and the potential risks to financial stability and benefits of these innovations, as well as how they might fit within the FSB's monitoring framework, are discussed within the Experts Group and, when appropriate, reported to senior FSB committees.

For the 2018 monitoring exercise, the rapidly increasing role of online platforms or financial technology-related non-bank entities in extending credit or facilitating credit creation (FinTech credit) continued to be a common theme across jurisdictions. While the business models of these entities vary across jurisdictions, many cited innovations in crowd-funding and peer-to-peer (P2P) lending, as in the 2017 monitoring exercise. For a more detailed discussion of FinTech credit, see Section 5.1.

[18] As a result of data gaps being reduced over time, changes in aggregated historical data may to some extent also reflect improvements in the availability of data over time at the jurisdiction level. Thus, the results in this Report may not be strictly comparable to those presented in previous Reports.

[19] For example, changes in asset prices or changes in the quantity of assets valued at a given price.

[20] Financial auxiliaries consist of financial corporations that are principally engaged in activities associated with transactions in financial assets and liabilities or with providing the regulatory context for these transactions, but in circumstances that do not involve the auxiliary taking ownership of the financial assets and liabilities being transacted (see EC et al (2009)).

In relation to this, members also identified:

- *Crowd-funding used to raise mortgage down payments*, where an electronic platform allows prospective homebuyers to raise money for a down payment on a mortgage.
- *Crypto-asset-based lending*, where a non-bank provides loans that are collateralised by crypto-assets. In one case, such loans were granted to purchase "mining equipment" (computers that allow users to solve algorithms to mine crypto-assets).
- *Tokenised funds* or investment funds that issue proprietary tokens to investors and invest the proceeds in various assets, such as real estate development loans or digital assets. Currently, such funds are mostly closed-ended and thus less subject to redemption pressures, although one jurisdiction highlighted that one of these funds commits to buying back its tokens (with certain conditions) from an exchange on a quarterly basis.

Although these activities still constitute a very small part of the financial system, such activities are growing rapidly. Also, while most jurisdictions noted very little existing links between these activities and the rest of the financial system, interconnectedness could increase if, for example, banks underwrite FinTech loans, or investment funds invest in FinTech products. Thus, some jurisdictions emphasised the need for enhanced monitoring and data collection of such activities.

Separately, the FSB has developed a framework in collaboration with the Committee on Payments and Market Infrastructures (CPMI), to monitor the financial stability implications of developments in crypto-asset markets, and published a report in July 2018 that sets out the metrics that the FSB will use to monitor crypto-asset markets as part of its ongoing assessment of vulnerabilities in the financial system.[21]

In addition to FinTech-related non-bank financial activities, several jurisdictions reported activities that do not necessarily fit into existing regulatory regimes or instances where existing regulated NBFIs have branched out into new activities. One jurisdiction noted that registered hedge funds have started to seek regulatory approval to engage in alternate types of investment activities, including investment in infrastructure and crypto-assets (such requests have been denied to date). Another member authority mentioned that regulation, which has increased the flexibility of closed-ended funds within their jurisdiction, has allowed such funds' risk profile to be structured more similarly to open-ended funds. Although these new activities are still very limited, relevant authorities are closely following their developments.

Finally, one jurisdiction highlighted the revival in the collateralised loan obligations (CLO) market and the recent increase in leveraged loans, especially those with covenant-lite structures. For a more detailed discussion on leveraged loans and the role of non-bank financial entities, see Section 5.2.

[21] See FSB (2018b) and FSB (2018c).

2. Macro-mapping of all non-bank financial intermediation

This section first provides a broad overview of the size and growth of key parts of the global financial system. It focuses on trends in the main NBFI sectors that comprise the monitoring universe of non-bank financial intermediation (MUNFI), namely insurance corporations, pension funds, and OFIs. It then looks at their involvement in credit intermediation and their reliance on wholesale funding (including repos). The macro-mapping categories presented are largely aligned with sectoral balance sheet statistics.[22]

2.1 Overview of trends

Exhibit 2-1 provides an overview of the size and growth of key parts of the global financial system. Overall, total global financial assets of all financial corporations (hereafter "total global financial assets") grew by 5.3% in 2017 to reach $382.3 trillion in the *21+EA-Group*. Of the major financial sectors, banks (defined as all deposit-taking corporations) grew the slowest (2.8%) in 2017, at less than half the rate of OFIs (7.6%). Financial auxiliaries saw the highest rate of growth (22.6%), driven largely by a few jurisdictions (France, Japan and the UK).

Macro-mapping of the financial system

21+EA-Group

Exhibit 2-1

	Total global financial assets	Central banks	Banks	Public financial institutions	MUNFI: Insurance corporations[1]	MUNFI: Pension funds	MUNFI: OFIs	MUNFI: Financial auxiliaries
Size at end-2017 (USD trillion)	382.3	30.1	150.8	17.0	32.8	33.7	116.6	1.2
Share of total global financial assets (%)	100.0	7.9	39.4	4.5	8.6	8.8	30.5	0.3
Growth in 2017 (year-over-year, %)	5.3	8.8	2.8	4.9	4.8	6.8	7.6	22.6
Growth 2011-16 (annualised growth, %)	5.9	8.9	3.6	4.2	6.0	6.1	8.9	7.0

Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). [1] For some jurisdictions, data on insurance corporations include separate accounts.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

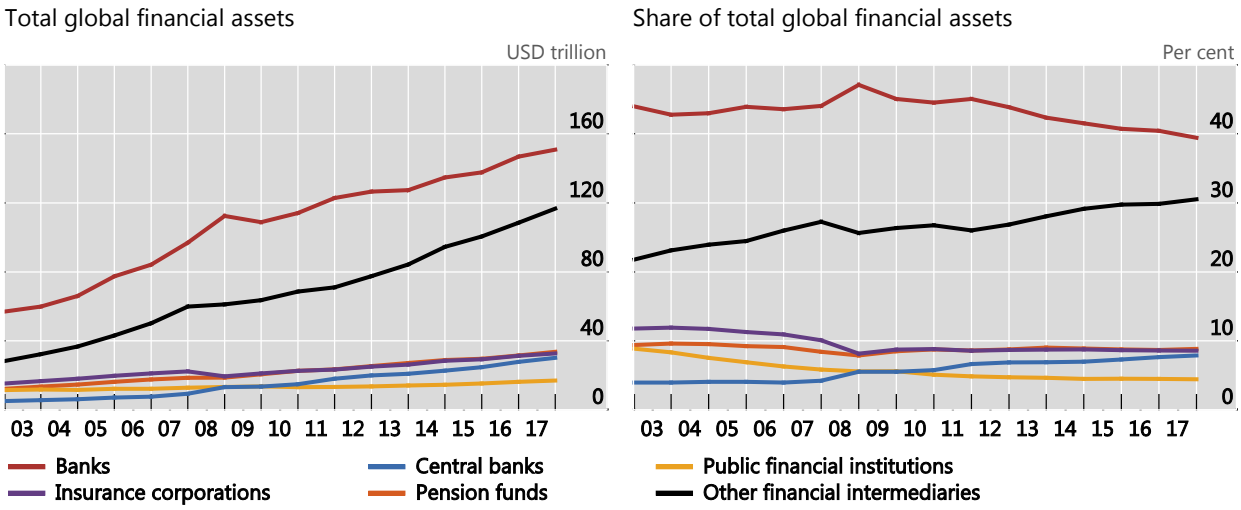
Exhibit 2-2 illustrates the trends of these sectors and their share of total global financial assets. Since 2008, banks' share of total global financial assets has declined (from 45% to 39%), as OFIs have taken on a larger share (from 26% to 31%). This trend has been more pronounced in China and the euro area.

[22] 19 jurisdictions currently use sectoral balance sheet statistics in their data submissions. Jurisdictions that currently lack sectoral balance sheet statistics have used other data sources (eg publicly available information, supervisory data) which may not be fully consistent with the data from other participating jurisdictions.

Assets of financial intermediaries[1]

21+EA-Group

Exhibit 2-2



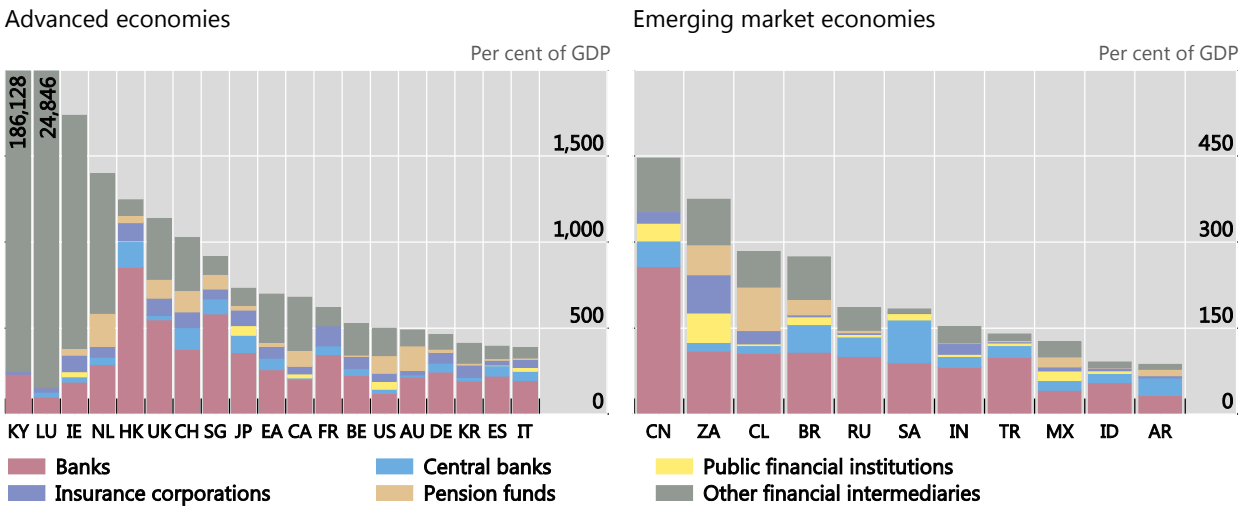
[1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017).

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Composition of financial systems[1]

Per cent of GDP at end-2017, *21+EA Group* at end-2017

Exhibit 2-3



[1] Assets invested in foreign jurisdictions may distort these ratios.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); IMF *World Economic Outlook*; FSB calculations.

Exhibit 2-3 illustrates the composition of financial systems of participating jurisdictions, with advanced economies on the left and emerging market economies (EMEs) on the right. Banks are the largest sector of the financial system in 18 jurisdictions in the *21+EA-Group*, particularly in Asia and EMEs. However, this is not the case for all jurisdictions. In jurisdictions where OFIs comprise a large share of the financial system (eg the Cayman Islands, Ireland, Luxembourg and the Netherlands), these OFIs often significantly exceed their GDP. In these jurisdictions, OFIs largely consist of investment funds or CFIMLs. In a limited number of jurisdictions, central banks also hold a relatively large share of financial assets. For example, the Saudi Arabian Monetary Authority, which also manages the jurisdiction's foreign exchange reserves accumulated from the conversion of oil reserves into monetary reserves, accounts for about 40% of total domestic financial assets. Finally,

in a handful of jurisdictions (Australia, Chile, South Africa and the US), insurance corporation and pension fund sectors are relatively large, together holding over 30% of total domestic financial assets (compared to a global average of 17%).

2.2 MUNFI trends

This section takes a closer look at the trends in the main NBFI sectors that comprise MUNFI, first looking at insurance corporations and pension funds, and then at OFIs.

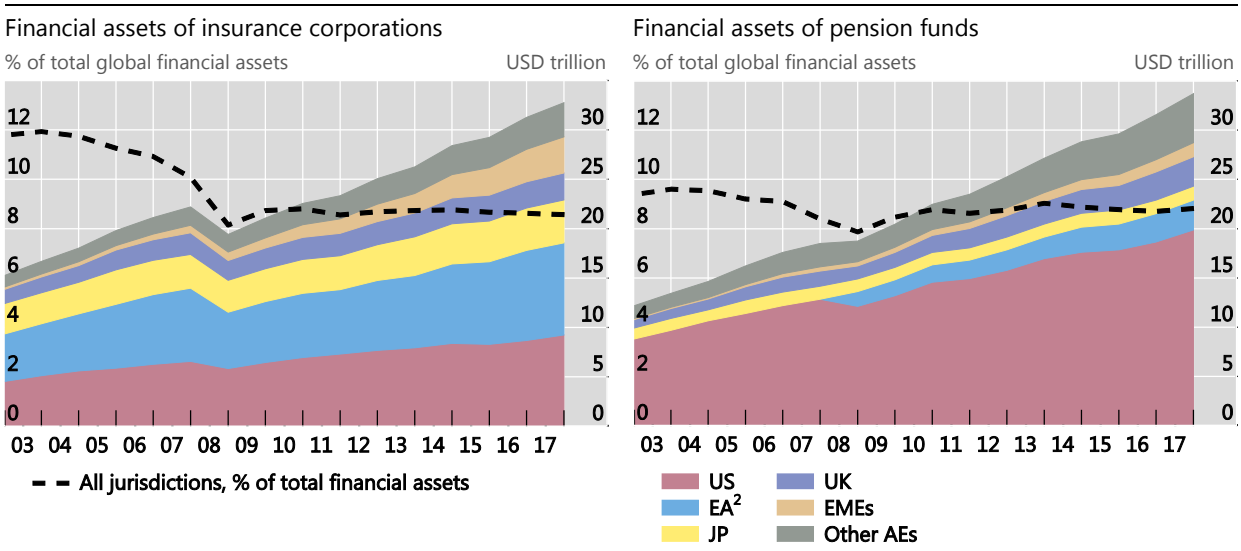
2.2.1 Insurance corporations and pension funds[23]

Exhibit 2-4 shows the growth and financial assets of insurance corporations and pension funds. Insurance corporations have grown consistently since 2009, although their share of total global financial assets has fallen slightly over this period. In 2017, the growth of insurance corporations' financial assets was broad-based, with all jurisdictions seeing increases in insurance assets,[24] although growth varied significantly across jurisdictions. The three largest jurisdictions grew at differing rates (the US, comprising 28% of global insurance corporations, grew by 6.6%; the euro area, comprising 28%, grew by 1.9% and Japan, comprising 13%, grew by 1.4%).

Insurance corporations and pension funds

21+EA-Group[1]

Exhibit 2-4



[1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). [2] EA pension fund data were not provided prior to 2009.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); IMF *World Economic Outlook*; FSB calculations.

[23] Some insurance corporation and pension fund assets may be included in the narrow measure if they engage in credit intermediation with bank-like risks such as maturity/liquidity transformation. This may occur when such entities purchase credit assets or engage in direct lending activities (where permitted by the relevant regulatory regimes). They may also facilitate credit creation by providing credit enhancements or writing puts on credit assets. Through their activities, both insurance corporations and pension funds may also become interconnected with banks and OFIs. For example, an institution writing a put option on a credit asset is agreeing to purchase a credit asset at a specified price, should the other party to the agreement choose to sell.

[24] In the *29-Group*, Belgium and the Netherlands saw declines.

Pension fund financial assets have expanded continually since 2009, in large part due to high equity market returns.[25] The US constitutes 59% of global pension fund assets and, due to its size, was the primary driver behind pension fund growth. However, pension fund assets also grew in jurisdictions with smaller shares of global pension fund assets such as the euro area (at 9%) and Australia (at 6%).

2.2.2 Other financial intermediaries (OFIs)

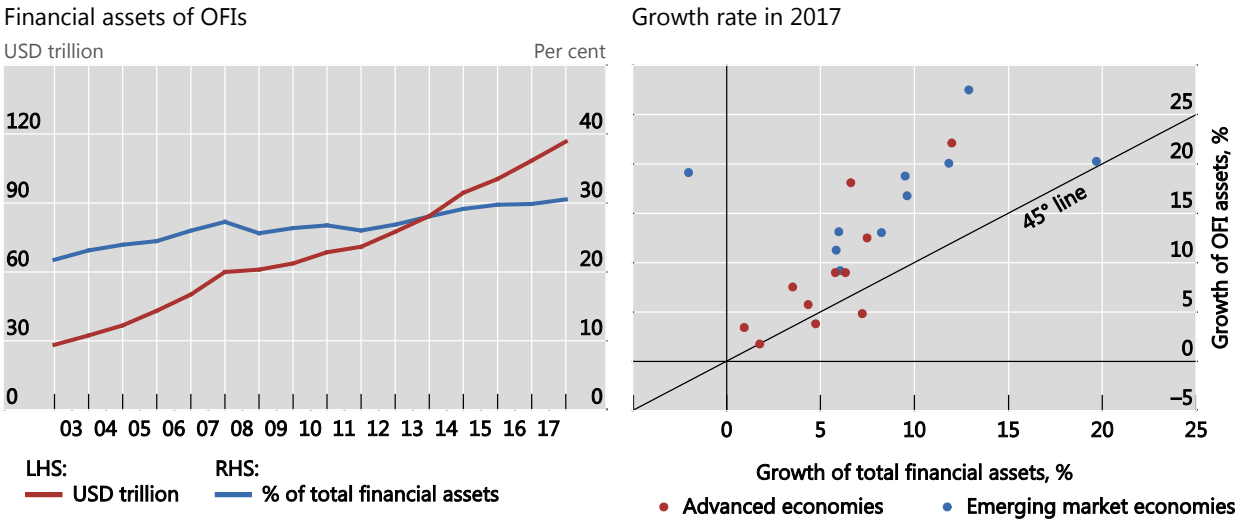
OFIs are financial entities other than central banks, banks, insurance corporations, pension funds, public financial institutions, and financial auxiliaries. They include a variety of non-bank financial entity types including investment funds, broker-dealers and SFVs. This section examines overall trends in OFIs and then the trends in 10 core OFI sub-sectors.[26]

(i) Global trends and developments across jurisdictions

OFI assets[1]

21+EA-Group

Exhibit 2-5



[1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017).

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); IMF *World Economic Outlook*; FSB calculations.

Exhibit 2-5 illustrates the level and growth of OFI financial assets. The OFI sector has grown consistently over the past few years, increasing to around 31% of total global financial assets, the highest level over the years for which data has been collected. Although the global growth rate of OFIs was lower in 2017 than in recent years, seven jurisdictions (Argentina, Chile, Hong Kong, Indonesia, India, Saudi Arabia and the US) saw OFI assets grow over five percentage points faster in 2017 than their average annual growth rates between 2011 and 2016. This growth was driven by different factors in each jurisdiction. In most jurisdictions, it was driven by growth in investment funds (eg equity or fixed income funds), but CFIMLs (Chile), broker-dealers (Hong Kong) and finance companies (India) also

[25] See OECD (2018).

[26] The 10 core OFI sub-sectors, as described in Exhibit 2-8, are broadly in line with the typical structure of jurisdictions' sectoral balance sheet statistics. Individual jurisdictions reported additional sectors where applicable. Many OFI entities are also entities that authorities included in the five economic functions as part of the narrow measure (see Section 4).

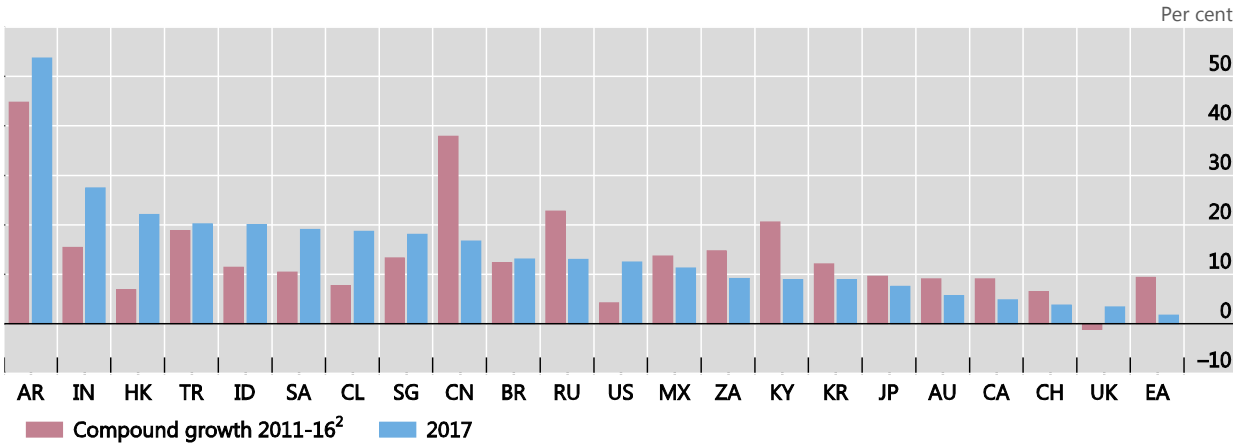
contributed significantly in some jurisdictions. The increase in fund assets (particularly equity funds) is driven in part by asset price appreciation, as this Report does not adjust for changes in valuation.

In 2017, OFI assets grew in all jurisdictions (Exhibit 2-6), primarily driven by the jurisdictions with the largest OFI sectors (China, the euro area and the US).[27] Indeed, OFI assets grew faster than total global financial assets in 19 jurisdictions.

Annual growth of OFI assets

21+EA-Group, by jurisdiction[1]

Exhibit 2-6



Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). [1] Growth rates in Argentina reflect a high rate of inflation. [2] Growth rates for China are from 2013-16, for Hong Kong are from 2012-16 and for Russia are from 2014-16.

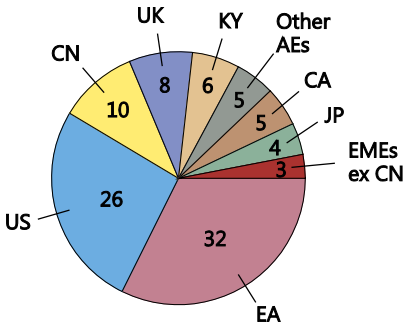
Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Share of global OFI assets

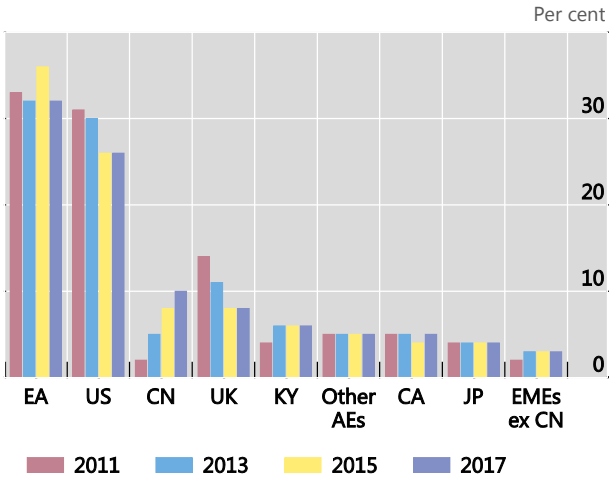
21+EA-Group

Exhibit 2-7

At end-2017



Historical evolution of the shares by jurisdiction[1]



Other AEs (advanced economies) include AU, CH, HK, KR and SG. EMEs include AR, BR, CL, ID, IN, MX, RU, TR, SA and ZA. [1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017).

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

[27] In the *29-Group*, Belgium, Luxembourg and Spain saw a decline in OFI assets, largely due to a decline in CFIML assets.

Advanced economies' share of global OFI assets has decreased steadily over time, while that of EMEs has increased. Most notably, as China's OFI assets have grown to $11.8 trillion in 2017 (the third-largest jurisdiction in terms of OFI assets), jurisdictions such as the UK and the US now comprise a relatively smaller share of global OFI assets (Exhibit 2-7, RHS).

Several jurisdictions have OFI sectors that are very large compared to their domestic economy. OFI assets were 2,243 times GDP in the Cayman Islands and within the euro area, 248 times GDP in Luxembourg, 14 times GDP in Ireland, and eight times GDP in the Netherlands.[28] In these jurisdictions, the largest OFIs are often investment funds or CFIMLs with limited linkages to their respective domestic economies. For example, a majority of the assets of investment funds in the Cayman Islands are managed and/or marketed outside of the jurisdiction, particularly in the US.

(ii) OFI sub-sectors

This section provides details on the 10 largest OFI sub-sectors for the *29-Group* sample.[29] Among the OFI sub-sectors, investment funds (other than MMFs and hedge funds) remain the largest OFI sub-sector in 2017, followed by CFIMLs. While trust companies were the fastest-growing OFI sub-sector, broker-dealers saw the largest decline. SFVs grew for the first time since the global financial crisis. Exhibit 2-8 describes the 10 main OFI sub-sectors, which are illustrated in Exhibit 2-9.

OFI sector breakdowns

Exhibit 2-8

29-Group

Sub-sector	Size, share of global OFI assets, change in 2017	Description
Investment funds (other than MMFs and hedge funds)	$45.0 trillion, 38.4% share, 13.6% growth	Investment funds remain concentrated in the US and participating euro area jurisdictions, which represent about 43% and 29% of global investment fund assets, respectively. Growth occurred across fund categories in 2017: equity funds grew by 17.0% to $23.0 trillion; fixed income funds grew by 10.0% to $11.6 trillion; and mixed/other funds grew by 10.4% to $10.3 trillion. Equity funds have grown to comprise a larger share of investment funds in recent years (Exhibit 2-10), due in part to asset price appreciation.
Captive financial institutions and money lenders (CFIMLs)	$25.9 trillion, 22.1% share, 0.5% decline	Four jurisdictions (Canada, Luxembourg, the Netherlands and the UK) account for 81% of global CFIML assets. While most jurisdictions saw an increase in CFIML assets, declines in three jurisdictions (Belgium, Luxembourg and Spain) drove the overall slight decline in CFIML assets. This decline was in some jurisdictions partly due to both currency effects and low interest rate environments reducing tax advantages.
Broker-dealers	$9.6 trillion, 8.2% share, 1.1% decline	Broker-dealers remain concentrated in the US (32% of global broker-dealer assets), the UK (30%) and Japan (17%). The decline in 2017 was

[28] No other jurisdictions have OFI sectors larger than five times their GDP.

[29] See Exhibit 1-1.

		driven by a 9.9% decline in UK broker-dealer's financial assets (in part due to currency effects) that offset appreciations in several jurisdictions.
MMFs	$5.8 trillion, 5.0% share, 10.2% growth	MMFs are concentrated in the US (at 49% of global MMF assets), China (18%), Ireland (10%), France (7%) and Luxembourg (6%). US government MMFs[30] comprise most of the assets of the US MMF sector, reflecting a shift in assets from prime MMFs (which invest primarily in corporate debt securities) to government MMFs, following the US MMF regulatory reforms that came into effect in 2016. The regulatory structure of US government MMFs requires them to primarily hold government securities, repos backed by those securities, and cash.[31] Much of the growth in 2017 occurred in China (57.2% growth) and the US (4.4%). Across jurisdictions, growth varied significantly, with MMF assets declining in 11 jurisdictions, including in several euro area jurisdictions and Russia. Funds offering constant (stable) net asset value (NAV) held 82% of global MMF assets, with the remainder (18%) held by variable (floating) NAV funds (Exhibit 2-11).
Hedge funds[32]	$4.4 trillion, 3.8% share, 15.8% growth	Hedge funds' assets grew in 2017, based on data reported from 15 jurisdictions.[33] The Cayman Islands continues to be the largest hub for such funds among reporting jurisdictions (87% of submitted total hedge fund assets) where they grew by 17.5%, driving the overall growth of the reported sector.[34]
Structured finance vehicles (SFVs)	$4.9 trillion, 4.2% share, 2.2% growth	SFVs assets increased for the first time since the financial crisis. This growth was mostly in several of the participating euro area jurisdictions (in particular, Italy and Luxembourg), the Cayman Islands, China and India. However, SFV assets did not increase in all jurisdictions, with declines in assets in some large markets such as the US.
Trust companies	$4.6 trillion, 3.9% share, 27.1% growth	China accounted for most trust company assets (88% of global trust company assets) and overall growth. The growth rate of China's trust company assets has increased over the past three years (16.6% in 2015, 24.0% in 2016 and 29.8% in 2017).[35]

[30] US government MMFs include US treasury MMFs, which are required to invest: (i) 99.5% of their assets in US government securities, or repos collateralised by US government securities or cash; and (ii) at least 80% of their assets in US Treasury securities or repos collateralised by US Treasury securities or cash.

[31] See Box 2-2 in FSB (2018a).

[32] Hedge funds typically have more flexible investment strategies than mutual funds. Since they are usually marketed by way of "private placement" to sophisticated, institutional or professional investors, they are often not subject to some regulations designed to protect retail investors.

[33] They are Canada, the Cayman Islands, France, Germany, India, Ireland, Italy, Luxembourg, the Netherlands, Russia, Singapore, South Africa, Spain, Turkey and the UK.

[34] There is no separate licensing category for hedge funds incorporated in the Cayman Islands, thus the Cayman Islands Monetary Authority (CIMA) estimated their size based on certain characteristics (eg leverage).

[35] See Box 2-5 in FSB (2018a).

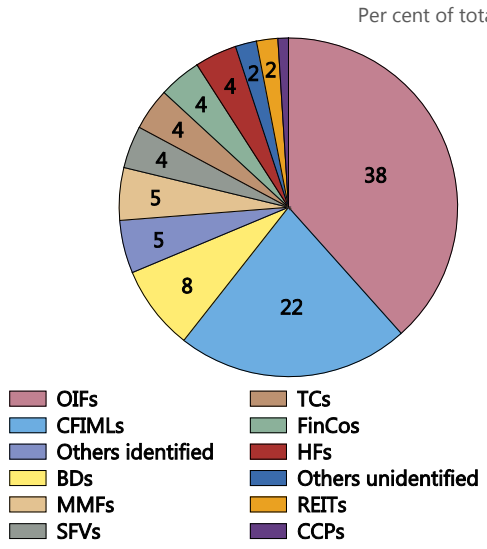
Finance companies	$4.5 trillion, 3.9% share, 4.1% growth	While the US and Japan continued to have the largest finance company sectors (at 33% and 12% of global finance company assets, respectively), finance companies in EMEs grew the fastest, at a 10.5% annual rate in 2017. This growth was driven by China (where finance company assets grew by 42.8%) and India (21.2%).[36]
Real estate investment trusts and real estate funds (REITs)	$2.3 trillion, 2.0% share, 11.4% growth	Equity REITs were roughly twice the size of mortgage REITs,[37] and were larger than mortgage REITs in all jurisdictions except the US. Equity REITs grew by 12.7% in 2017, driven by growth in Korea and the US. Mortgage REITs grew by 7.9%, driven by growth in the Netherlands and the US. Growth in the Netherlands mostly reflects investments of pension funds in residential mortgages through mortgage REITs.
Central counterparties (CCPs)	$0.8 trillion,[38] 0.7% share, 3.7% growth	CCPs were reported by 12 jurisdictions.[39] Growth in CCP assets was primarily driven by Australia, Canada, Hong Kong, the UK and the US.

Major OFI sub-sectors

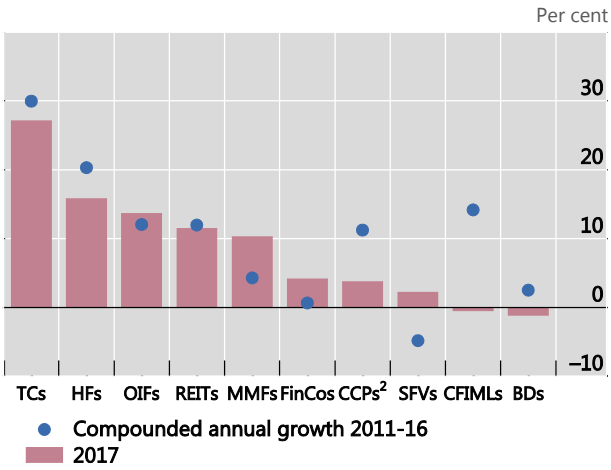
29-Group

Exhibit 2-9

At end-2017



Annual growth[1]



BDs = broker-dealers; FinCos = finance companies; HFs = hedge funds; OIFs = Investment funds other than MMFs and hedge funds; TCs = Trust companies. [1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). [2] CCP growth rates exclude one jurisdiction where assets grew substantially in 2017 due to an accounting change at a CCP.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

36 For details on non-bank finance companies in India, see RBI (2017).

37 For REITs, data on total assets, rather than total financial assets, are collected. Equity REITs invest in and own physical property and their revenues therefore come principally from their properties' rent. Mortgage REITs, in contrast, do not invest in physical real-estate but derive most of their income from investment and ownership of debt instruments (ie payments on mortgage loans). See Box 4-1 of FSB (2014).

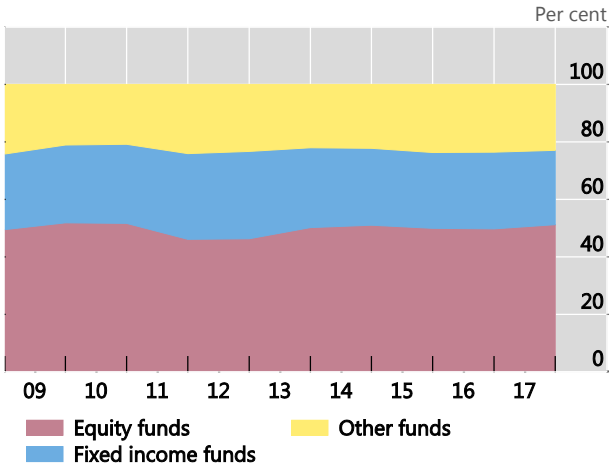
38 Total CCP assets include all CCPs, but the calculated growth rate for CCPs excludes one jurisdiction (where assets grew substantially in 2017 due to an accounting change at a CCP).

39 They are Argentina, Australia, Brazil, Canada, Hong Kong, India, Mexico, Russia, Singapore, Spain, the UK and the US.

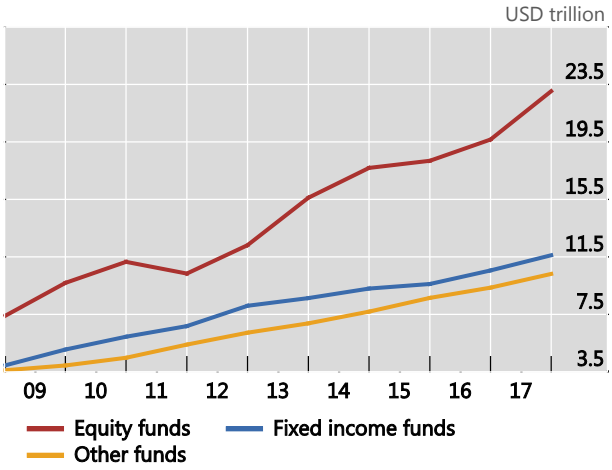
Composition of investment funds other than hedge funds and MMFs (OIFs) Exhibit 2-10

29-Group

Share of OIF assets



Total financial assets



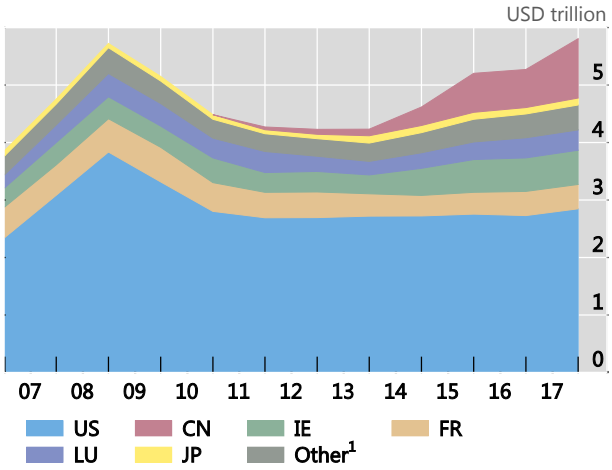
Other funds include mixed and "other" funds.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

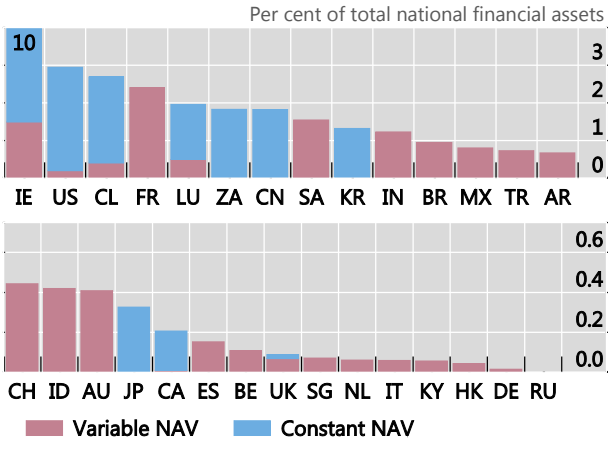
Assets of MMFs Exhibit 2-11

29-Group

By jurisdiction



By type and jurisdiction, at end-2017



[1] Other = AR, AU, BE, BR, CA, CH, CL, DE, ES, HK, ID, IN, IT, KR, KY, MX, NL, RU, SA, SG, TR, UK and ZA.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

2.3 Credit intermediation and wholesale funding of NBFIs

This section takes a closer look at the involvement of non-bank financial intermediaries in credit intermediation and lending, as well as their use of wholesale funding and repo activity. On NBFI's involvement in credit intermediation, a separate analysis of the cyclical characteristics of bank and non-bank credit is provided in Section 5.3, using a different dataset and broader definition of non-bank credit (ie including all non-bank credit sources to the private non-financial sector). This analysis highlights the synchronisation of non-bank credit cycles across jurisdictions as well as bank credit cycles across jurisdictions, and the benefits of monitoring non-bank credit to predict currency crises.

2.3.1 *Credit intermediation and lending*

Data were collected on the credit and lending assets of banks, insurance corporations, pension funds and OFIs, as well as for several OFI sub-sectors.[40] Together, these data provide the basis for analysing changes in the credit and lending activities of various entity types, including shifts between sectors. Significant improvements were made in the 2018 monitoring exercise, with more comprehensive data submitted by jurisdictions and the data collection covering a wider set of OFI sub-sectors. Exhibit 2-12 provides an overview of the credit assets described in this section.

Credit and lending in the financial system

21+EA-Group

Exhibit 2-12

	Total	Banks	Insurance corporations	Pension funds	OFIs
Credit assets (including deposits) (USD trillion at end-2017)	183.5	112.6	17.7	8.5	44.7
Growth (% in 2017)	4.6	5.2	1.8	4.4	4.3
Credit assets (excluding deposits) (USD trillion at end-2017)	169.5	103.4	16.9	7.9	41.3
Growth (% in 2017)	4.5	5.0	2.2	4.4	4.3
Loan assets (USD trillion at end-2017)	97.2	78.9	2.3	0.3	15.8
Growth in (% in 2017)	5.1	6.2	1.9	18.1	0.2

Some exchange rate effects have been netted out by using a constant exchange rate (from 2017).

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

(i) Credit assets

In 2017, overall growth in credit intermediation (credit assets excluding deposits)[41] by banks (5.0%) outpaced growth in credit intermediation by non-bank financial intermediaries such as insurance corporations (2.2%), pension funds (4.4%) and OFIs (4.3%). This result is perhaps not surprising given the focus and specialisation of banks in credit intermediation.

Between 2011 and 2017, the credit assets of OFIs (excluding deposits) have grown by an average annual rate of 6.3%, which slowed to 4.3% growth in 2017. The drivers of this growth have shifted over time, with over half of the growth since 2011 accounted for by the euro area. Most of the growth in 2017, however, was driven by China, India and the US. For OFIs, the credit assets held by fixed income funds, trust companies and hedge funds grew the fastest, due in part to asset price appreciation. While the growth in fixed income fund credit assets was relatively broad-based, the growth of trust company credit assets in China and hedge fund credit assets in the Cayman Islands account for large shares of these OFI sub-sectors.

Bank credit assets excluding deposits have grown at an average annual rate of 3.7% since

[40] "Credit assets" include loans and receivables, investments in debt securities and other credit-related assets (eg government debt and other debt instruments, repo assets) and deposits. "Loans" (or "lending") are a subset of credit assets that include loans and receivables. Credit and lending to financial entities and the government are included, except central bank deposits. OFIs in Sections 2.3 and 3 do not include CFIMLs.

[41] Deposits are considered credit assets as they constitute a credit exposure to a bank or other deposit-taking entity.

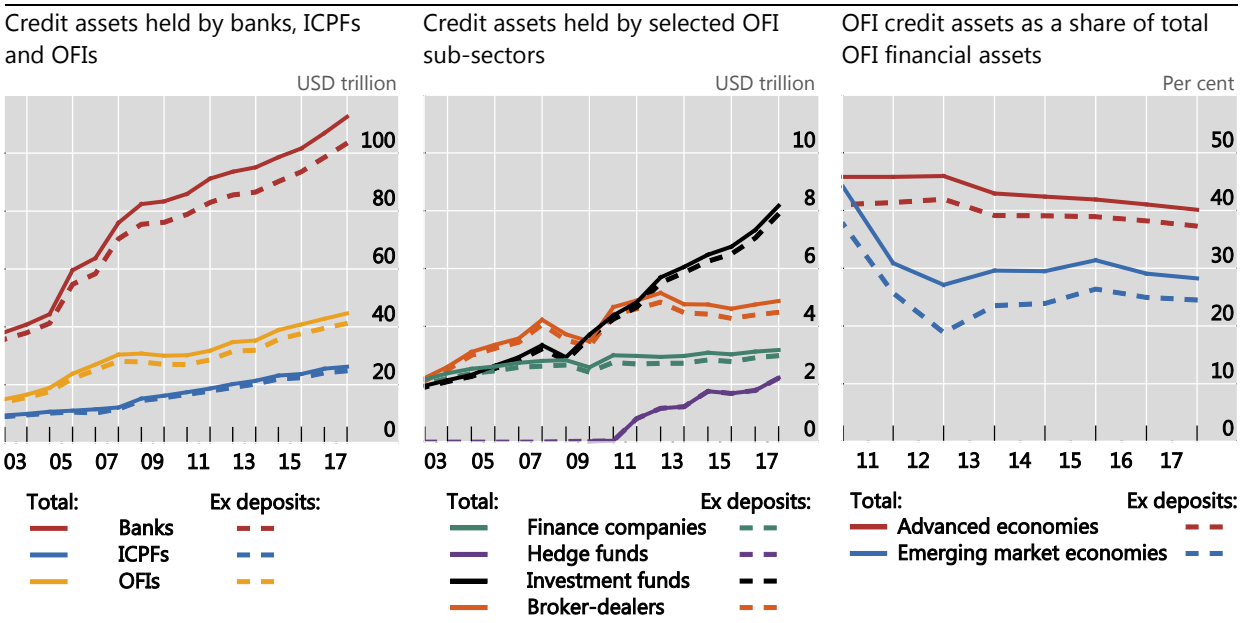
2011, accounting for over two-thirds of total bank assets during this period. In 2017, most jurisdictions saw an increase in bank credit intermediation, with the strongest growth seen in China (15.0%).

Credit assets represent a larger share of total OFI financial assets in advanced economies than they do in EMEs. However, while credit assets nominally increased in 2017, credit assets have slightly declined as a share of total OFI financial assets in both advanced economies and EMEs (Exhibit 2-13, RHS).

Credit assets[1]

21+EA-Group

Exhibit 2-13



ICPFs = Insurance corporations and pension funds. [1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017).

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

OFI deposits provide an indication of their interconnectedness with the banking system, which is discussed further in Section 3. While the deposits of OFIs at banks increased in 2017 (4.7%), they have steadily declined as a fraction of OFI assets since the financial crisis (Exhibit 2-14, LHS). In comparison, the deposit assets of banks increased 7.9%, with large increases seen in France, the UK and the US.[42] The deposits of insurance corporations decreased by 5.4%, and those of pension funds increased (4.3%).

The trend in OFI deposits was broad-based, reflected in many jurisdictions and OFI sub-sectors (Exhibit 2-14, RHS). Two exceptions to this trend were broker-dealers and MMFs. In contrast to overall OFI deposit assets, the deposits of broker-dealers have grown relative to total broker-dealer assets since the financial crisis. The deposits of MMFs accounted for 10.1% of overall MMF assets, the highest such ratio amongst OFI sub-sectors, but a smaller ratio than in recent years. MMF deposits, however, have followed a much different path from overall OFI deposits, having declined substantially in recent years before slightly reversing the trend in 2017.

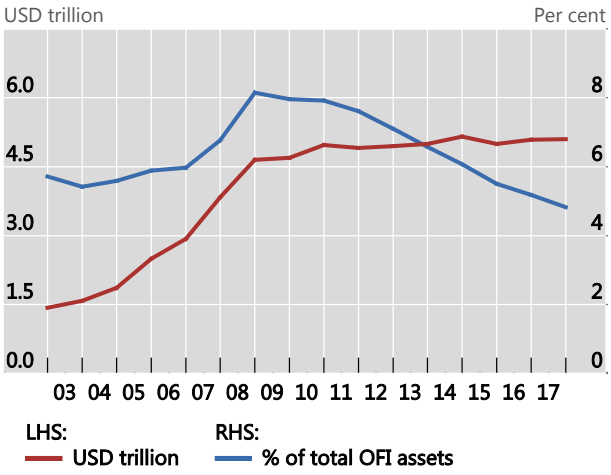
[42] Bank deposits in some jurisdictions may include deposits at a central bank.

OFI deposit assets

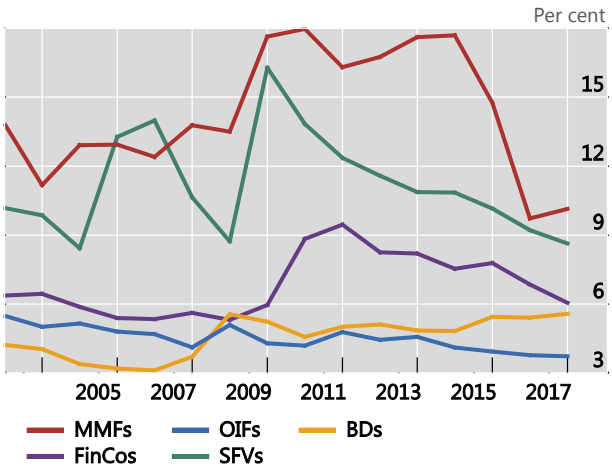
21+EA-Group

Exhibit 2-14

Total OFIs



OFI sub-sectors' deposits as share of sub-sectors' global financial assets



BDs = Broker-dealers; FinCos = Finance companies; OIFs = Investment funds other than MMFs and hedge funds.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

(ii) Lending

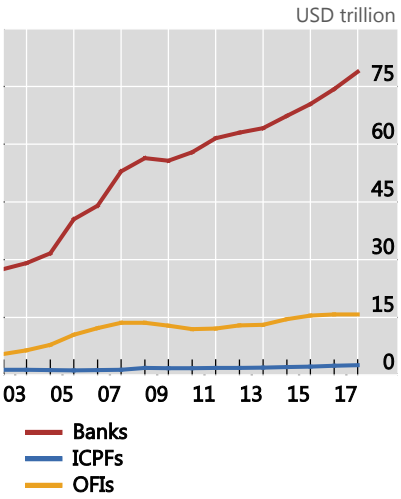
Loan assets are a subset of credit assets, described in the previous section. Lending by banks grew by 6.2% to $78.9 trillion in 2017 (Exhibit 2-15). About half of the total increase in bank loans was driven by China, with the euro area and the US also contributing significantly to global growth. Bank lending grew in all jurisdictions except Brazil, the Cayman Islands and Saudi Arabia.

Lending[1]

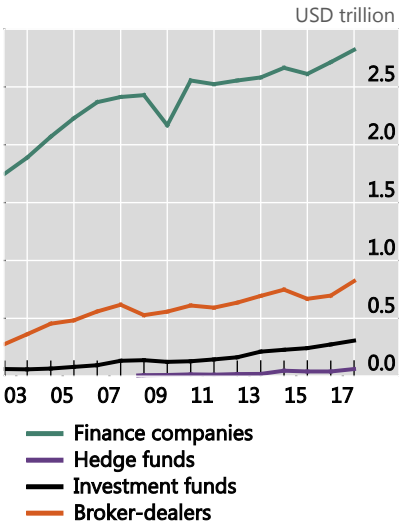
21+EA-Group

Exhibit 2-15

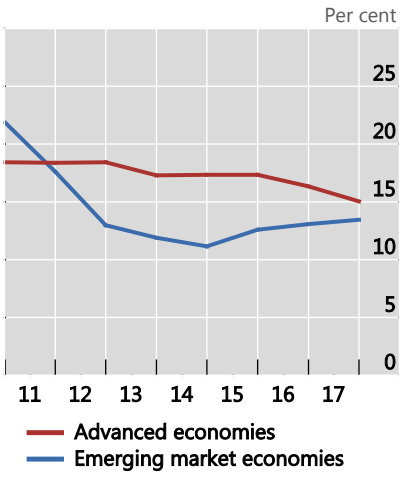
Lending by banks, ICPFs and OFIs



Lending by selected OFI sub-sectors



OFI lending assets as a share of total OFI financial assets



ICPFs = Insurance corporations and pension funds. [1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017).

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Banks continued to be the largest single source of lending, with their share of global loan assets at 81% at end-2017. Lending by OFIs grew slightly (0.2%) in 2017, to $15.8 trillion. The growth in lending by OFIs occurred largely in China, India, Japan and Korea, which offset declines in the euro area and the UK. As a fraction of total OFI financial assets, lending assets declined in most advanced economies (except Spain, Japan and Korea), while lending assets grew as a share of total OFI financial assets in EMEs, largely reflecting growth in China, which offset declines in most other EMEs.

Some larger OFI sub-sectors saw relatively large growth in lending assets. Lending by broker-dealers, while a small share of their total assets, rose by 17.7% to $0.8 trillion (driven by growth in Canada, Korea and the US). Lending by finance companies grew by 3.9% to $2.8 trillion (driven by growth in China and India).

2.3.2 Wholesale funding and repos

Wholesale funding instruments, which include repos, are important funding sources for banks as well as for non-bank financial entities. While wholesale funding instruments support price discovery and secondary market liquidity for a wide variety of securities, they can also be used by non-bank financial entities to create short-term, money-like liabilities, facilitating credit growth and maturity/liquidity transformation outside the banking system. This may pose financial stability risks by contributing to the build-up of leverage and maturity mismatches. Wholesale funding may also increase interconnectedness among financial institutions and contribute to pro-cyclicality.

OFIs have become less reliant on wholesale funding since 2011. Nonetheless, long-term wholesale funding is still the dominant source of funding for OFIs in aggregate, while short-term wholesale funding[43] (excluding repos) comprises a moderate portion of OFI funding at 5.0% of OFI assets (Exhibit 2-16, LHS).[44] OFIs' reliance on long-term wholesale funding varied substantially across jurisdictions, with OFIs in some jurisdictions using almost no long-term wholesale funding (China and the US) while others relied on long-term wholesale funding that ranged between 20% and 50% of total OFI assets (Australia, Indonesia, Korea, Luxembourg, Mexico, Netherlands and Spain). This reliance was typically due to either investment funds or SFVs.

OFIs continue to be net providers of cash to the financial system through reverse repos, while banks remain net recipients of cash through repos, as reflected by their net repo positions (Exhibit 2-16, RHS). Data collected for the first time in 2018 on the breakdown of OFI repo exposure by OFI sub-sectors allow a more granular analysis. Amongst OFIs, MMFs, trust companies and investment funds are net providers of cash through repos and their use of repo has grown faster than other OFI sub-sectors. Meanwhile, broker-dealers are net recipients of cash through repos. With respect to banks, while their overall reliance on wholesale funding as a source of funding has changed little over time, its composition has changed, with increased reliance on both long-term wholesale funding and repos.

---

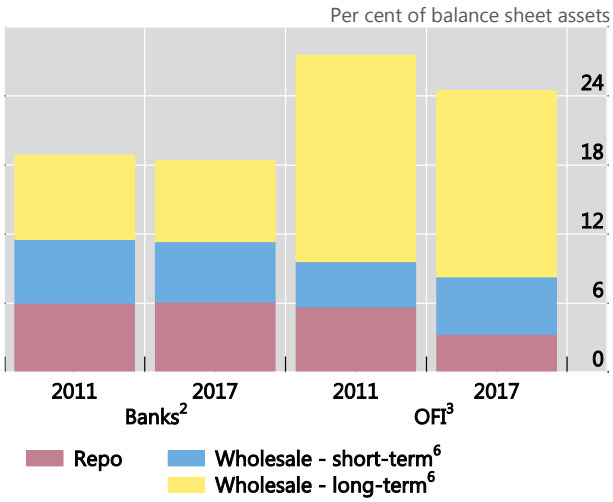
[43] Short-term funding is all wholesale funding with a residual maturity of less than 12 months.

[44] Wholesale funding data improved for the 2018 monitoring exercise both through more comprehensive definitions used in the exercise to reduce the potential for inconsistency, and through more comprehensive data submissions by jurisdictions.

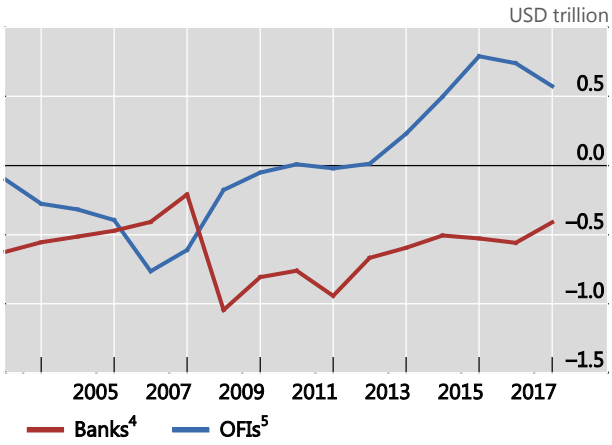
Wholesale funding

Exhibit 2-16

Funding of entities, by source



Net repo position (Repo assets - repo liabilities)[1]



[1] Assets related to repo transactions on the cash provider (collateral-taker) balance sheet. Liabilities related to repo transactions on the cash receiver (collateral-provider) balance sheet. [2] Bank funding data from AU, BR, CA, CH, ES, FR, KR, KY, LU, MX, NL, UK, US and ZA. [3] OFIs funding data from AU, BR, CN, ES, FR, IN, IT, KR, LU, MX, NL, SG and the US. Short-term funding is defined as funding with a residual maturity of less than 12 months. [4] Data for banks' net repo positions from AR, BR, CA, ES, FR, ID, IN, JP, MX, SA, UK and the US. [5] Data for OFIs' net repo positions from AU, BR, ES, FR, JP, IN, MX, SG and the US. [6] Excluding repos.

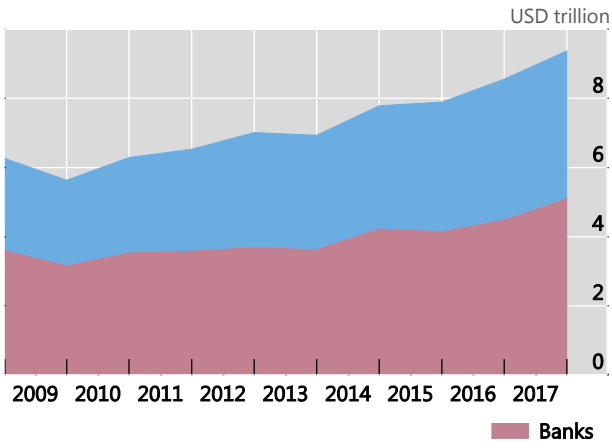
Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Total repo assets and liabilities

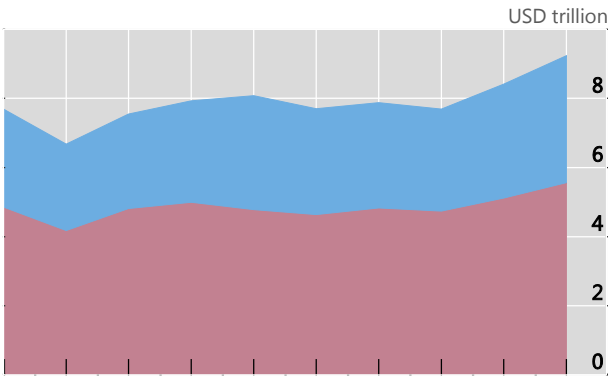
Exhibit 2-17

29-Group

Total repo assets of banks and OFIs



Total repo liabilities of banks and OFIs



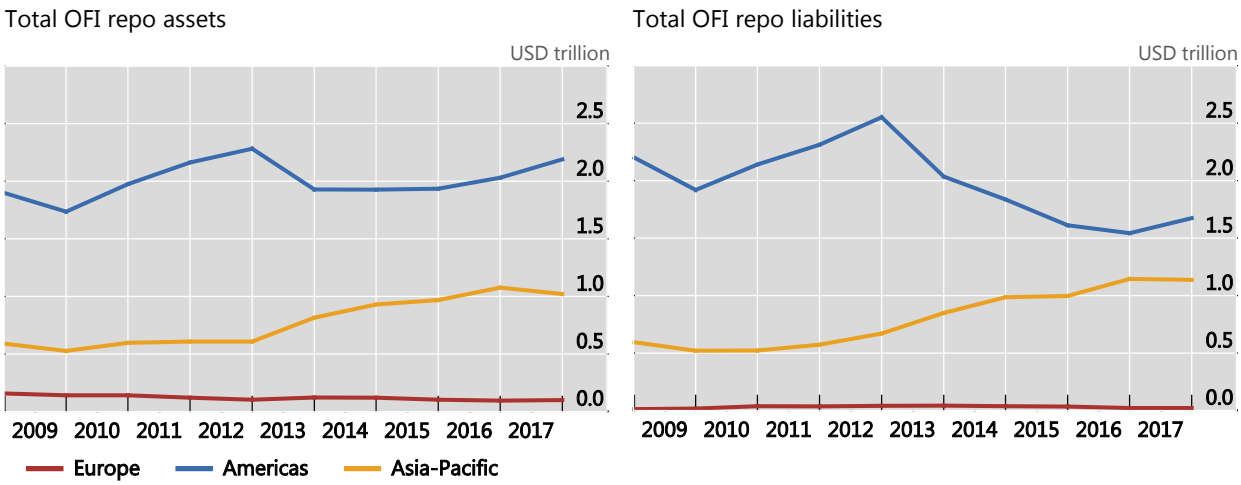
Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

In addition to differences across entity type, the use of repos varied significantly across jurisdictions. Banks, for instance, acted as net providers of cash through repos in some jurisdictions and net recipients in others. Activity was also concentrated in certain jurisdictions, with about half of all OFI repo assets located in the US, and just under a quarter in Japan.

The total repo assets of banks and OFIs grew by 9.6% in 2017 to reach $9.4 trillion, while their total repo liabilities grew by 9.8% to reach $9.2 trillion, largely driven by banks' increasing use of repos (Exhibits 2-17 and 2-18). Bank repo growth was driven by Canada, the UK and the US, while OFI repo growth was largely driven by China and the US. Indeed,

the largest players in repo markets varied significantly by region (Exhibit 2-19). A large driver of this difference is due to the fact that banks tend to play a larger role in many European jurisdictions' financial systems.

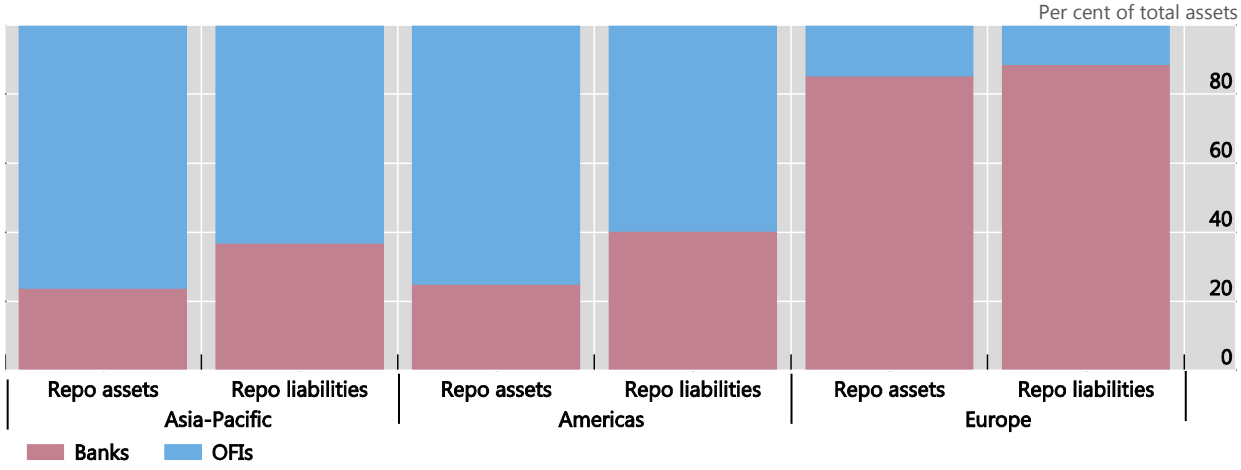
OFI repo assets and liabilities by geographical region — Exhibit 2-18



Europe = ES, FR, IT, NL and RU; Americas = BR, MX and the US; Asia-Pacific = AU, CN, IN, JP, KR and SG.
Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Breakdown of repo assets and liabilities across geographic areas — Exhibit 2-19

At end-2017



Americas = BR, MX and the US; Asia-Pacific = AU, CN, IN, JP, KR and SG; Europe = ES, FR, IT, NL and RU.
Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

3. Interconnectedness among financial sectors

Financial interconnectedness naturally develops in an open and integrated global financial system. While linkages between financial sectors can help to diversify risk, linkages can also transmit risks during periods of stress.[45] Interconnectedness may have implications for financial stability through funding and credit risk channels, particularly where these channels are associated with the build-up of leverage or maturity/liquidity mismatches. Therefore, linkages among banks, OFIs and other non-bank financial entities can be important indicators of potential contagion channels, within and across borders.

Linkages can be *direct* or *indirect*. Direct borrowing/lending and investment exposures between two counterparties are examples of direct interconnectedness. Indirect interconnectedness arises when two entities hold common assets (portfolio overlap) or when the market value of their equity or debt securities move together concurrently (co-movement).[46] This section primarily focuses on direct domestic linkages among banks, OFIs, insurance corporations, pension funds, as well as cross-border interconnectedness. Indirect linkages, specifically portfolio overlap in the euro area, are discussed in Box 3-1, while the co-movement of OFIs' assets across jurisdictions is discussed in Section 5.4. Box 3-1 shows that the investment fund sector in the euro area holds a large percentage of assets, similar to those held by other financial sectors in the euro area, suggesting a heightened potential for indirect contagion across sectors during periods of elevated stress through, for example fire sales. It also highlights the benefits of granular data collection, such as on securities holdings by each sector, to understand such indirect interconnectedness. Meanwhile, the case study on cross-border co-movement suggests that movements in OFI assets in one jurisdiction could be related to movements in OFI assets in other jurisdictions, notably in times of global stress (eg high US stock volatility index (VIX)). This preliminary analysis highlights the benefits of looking at the linkages between financial sectors and jurisdictions beyond direct interconnectedness for financial stability purposes.

To measure direct interconnectedness, the FSB compiles aggregate balance sheet data on the bilateral exposures between financial sectors (eg assets and liabilities of banks to OFIs and of OFIs to banks).[47] This aggregated data is used to calculate high-level measures of interconnectedness (including exposures and funding dependence) between sectors, as illustrated in Exhibit 3-1. Exposures refer to the balance sheet asset exposures that arise from credit provision and/or investment in equity to a counterparty, while use of funding

---

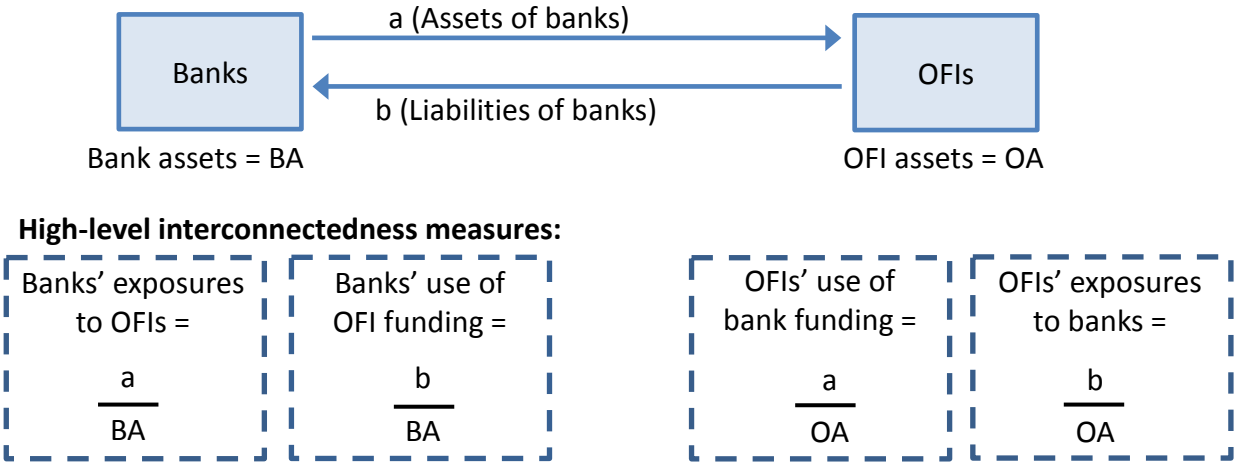
45 For example, if one or more large banks (particularly those with a high degree of leverage or significant maturity/liquidity transformation) are significant borrowers from OFIs, material credit deterioration of such banks could precipitate broader contagion across multiple OFIs, and possibly different OFI sub-sectors, especially in situations of general market stress. Similarly, if one or more large OFIs (particularly those with a high degree of leverage or significant maturity/liquidity transformation) are significant borrowers from one or more banks, material credit deterioration of those OFIs could precipitate broader contagion to a large bank or across multiple banks, which may spread to the entire banking system or other financial intermediaries.

46 For more information, see Kara et al (2015).

47 The FSB makes adjustments for assets and liabilities of OFIs that are prudentially consolidated into banking groups whenever jurisdictions provided the required granularity in their data submissions (in these cases data net of prudential consolidation are used). Most jurisdictions have followed their respective accounting rules and brought the full amount of an entity's assets back onto the bank's balance sheet, even in the case of partial ownership.

is the dependence or liability exposures that arise from obtaining funding from a counterparty.

A framework to analyse interconnectedness between banks and OFIs Exhibit 3-1



3.1 Overall interconnectedness among financial sectors

In the 2018 monitoring exercise, more jurisdictions submitted interconnectedness data covering a wider set of entities or over a longer historical period.[48] As a result, the overview of interconnectedness between financial sectors discussed here is more comprehensive than in previous Reports. Nevertheless, not all jurisdictions reported interconnectedness measures net of prudential consolidation for all entity types,[49] and some authorities only reported a subset of exposures.[50] Therefore, interconnectedness results may not be comparable across jurisdictions.

The available data suggest that, in aggregate, OFIs continue to be interconnected with banks, with funding channels operating in both directions (Exhibit 3-2, LHS). In aggregate OFIs sourced more funding from insurance corporations and from pension funds than from banks. However, financial system interconnectedness varies substantially across jurisdictions, and the *majority* of jurisdictions reported higher OFI funding from banks than from insurance corporations or pension funds. For example in Europe, interconnectedness between banks and OFIs tends to be larger than linkages between OFIs and either pension funds or insurance corporations. On the other hand, OFIs in the Americas are more interconnected with pension funds or insurance corporations than with banks.

In addition to aggregated values, interconnectedness can also be measured as a proportion of total financial assets of the relevant sector, to show the relative importance of the linkage for the specific sector (Exhibit 3-2, RHS). The blue circles represent the exposures

[48] Although improvements have been made, the direct interconnectedness measures currently do not capture derivatives and contingent exposures (eg bank lines of credit to OFIs). The FSB continues to improve the measures and the analysis going forward. Limited data especially on cross-border interconnectedness also pose significant challenges to a comprehensive assessment of the interconnectedness between banks and OFIs across borders.

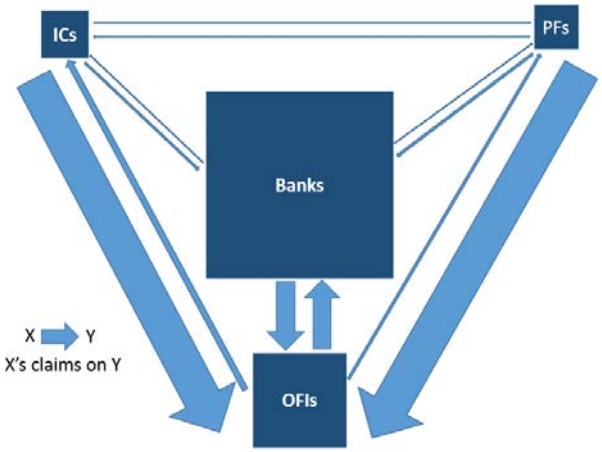
[49] Data net of prudential consolidation is used whenever available throughout this section, unless stated otherwise.

[50] For example, due to limitations in data availability, some jurisdictions only reported a subset of bank assets/liabilities (eg loans/deposits) to (some) OFI sub-sectors, instead of total bank assets/liabilities to all OFIs.

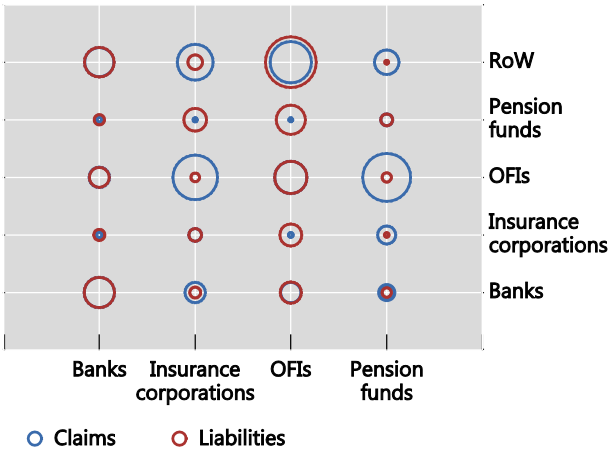
(as a percentage of their assets) that entities on the X-axis have to entities on the Y-axis. Similarly, the liabilities of entities on the X-axis as a percentage of their assets, are represented by red circles, and can be interpreted as a proxy for funding risk. Exhibit 3-2, RHS shows that in aggregate OFIs receive large portions of cross-border funding (roughly 32% of OFI assets), in addition to funding from within borders from other OFIs (13%), pension funds (10%), insurance corporations (6%) and banks (6%). Measured as a percentage of pension fund and insurance corporation assets, these exposures are significant (28% and 24% respectively). While banks, insurance corporations and pension funds have cross-border linkages, OFIs show the largest cross-border linkages to the rest of the world (ROW) when measured as a proportion of OFI assets.[51] Even though in aggregate the interconnectedness between OFIs and banks was smaller than the interconnectedness between OFIs and the ROW, many jurisdictions reported higher OFI interconnections to banks than to the ROW.

Interconnectedness among sectors[1] Exhibit 3-2

Aggregate linkages among sectors[2]



Aggregate linkages, as a per cent of financial assets[3]



Borrowing and funding centrality, and linkages as a percentage of total linkages[4]

	Funding centrality	Total claims over total linkages (%)	Borrowing centrality	Total liabilities over total linkages (%)
Banks	0.32	0.33	0.43	0.35
Insurance corporations	0.13	0.13	0.01	0.04
OFIs	0.37	0.36	0.55	0.61
Pension funds	0.18	0.19	0.00	0.00

[1] This exhibit illustrates high-level observations from the analysis of interconnectedness between banks, OFIs, pension funds and insurance corporations. [2] The thickness of the arrows reflects the absolute size of the exposures from a certain financial sector to the other. Cross-border exposures are not included (discussed in more detail in Section 3.4). [3] This matrix shows X's claims on and liabilities to Y, measured as a % of X's assets. Data were aggregated across jurisdictions where both linkage and asset data are available. [4] Funding and borrowing centrality measured as the left- and right eigenvectors of the aggregated whom-to-whom matrix. The output is normalised. Cross-border exposures are not taken into account. The computed measures do not capture risks from indirect interconnectedness and do not take into account important qualitative aspects, such as the difference between secured and unsecured liabilities.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Linkages among sectors can also be analysed by determining the funding and borrowing centralities of the various sectors (Exhibit 3-2, bottom). These measures provide

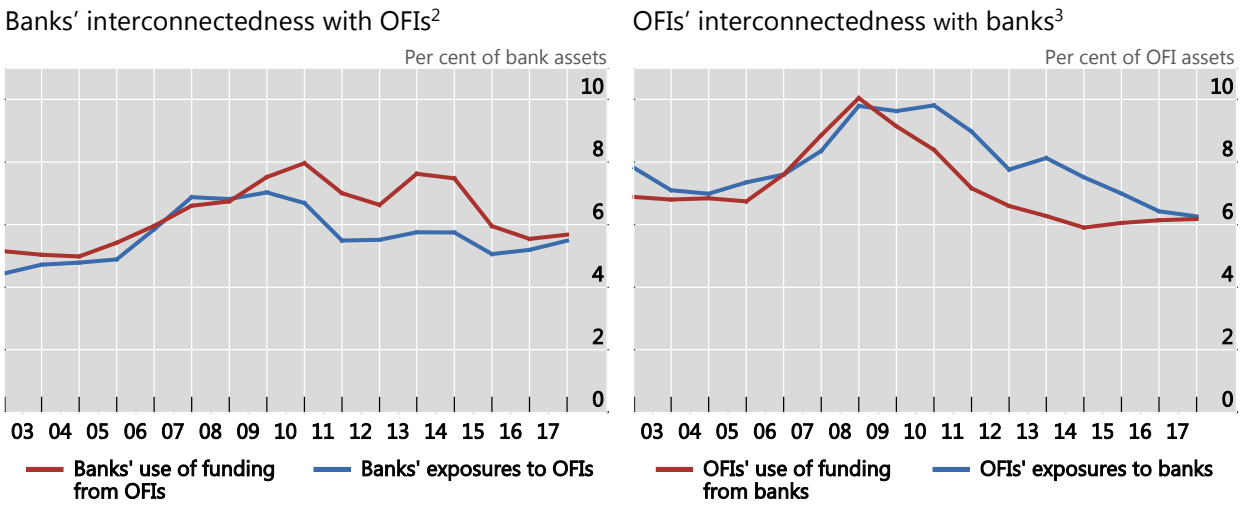
[51] Linkages with the ROW (or cross-border linkages) only include linkages with the financial sector in the ROW.

information about potential default cascades and capture the importance of a sector in providing funding.[52] For the table in Exhibit 3-2, the measures (ie eigenvectors) were normalised such that they are measured relative to the importance of other claims and other liabilities, respectively. The measures of borrowing and funding centrality are also compared to simple ratios of each entity's total liabilities and exposures over the total exposures of all entities. Therefore the funding centrality of banks indicates the importance of banks in providing funding, not only taking into account their direct exposures, but also the funding exposures of their counterparties. This analysis reveals that OFIs have the highest funding centrality, followed by banks. The importance of OFIs as funding providers also depends on the funding exposures of their counterparties, which are mainly banks. Pension funds have a relatively higher funding centrality than insurance corporations. Furthermore, OFIs also have the largest borrowing centrality, followed by banks, while from a borrowing perspective the interconnectedness of pension funds and insurance corporations is negligible. This is in line with the results discussed above, and further emphasises the importance of OFIs in the global financial system both as a source of funding, and as borrowers.

3.2 General trends in interconnectedness between banks and OFIs

Interconnectedness between banks and OFIs

20+EA-Group[1] Exhibit 3-3



[1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). [2] Banks' use of funding from OFIs = banks' liabilities to OFIs as a share of bank assets. Banks' exposures to OFIs = banks' exposures to OFIs as a share of bank assets. [3] OFIs' use of funding from banks = OFIs' liabilities to banks as a share of OFI assets. OFIs' exposures to banks = OFIs' exposures to banks as a share of OFI assets.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Banks and OFIs are directly connected, with funding channels operating in both directions. For example, banks extend credit to (or invest in) OFIs, OFIs provide funding to banks, or custodian banks receive the non-invested part of fund assets/operational deposits.

[52] Measures of borrowing and funding centrality were calculated using network theory methods, given by the right and left eigenvectors of the "whom-to-whom" matrix. See Box 3-2 of FSB (2017b).

Funding and credit interconnectedness between banks and OFIs increased marginally in 2017, measured as a percentage of bank assets, but remained at levels similar to those observed prior to the global financial crisis (Exhibit 3-3, LHS).[53] In aggregate, banks' exposures to OFIs increased to 5.5% of bank assets at end-2017 (from 5.2% at end-2016), while banks' use of funding from OFIs increased to 5.7% (from 5.5% at end-2016).[54]

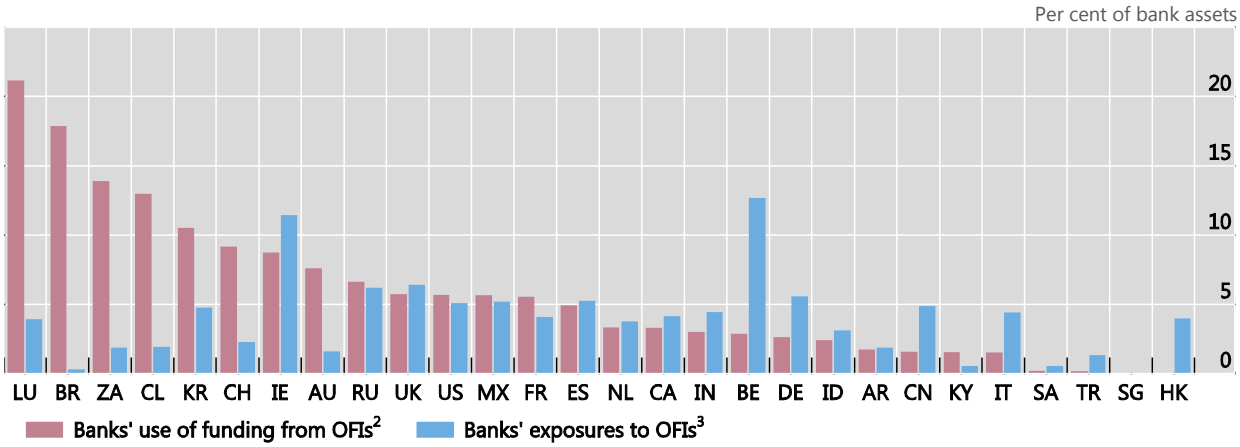
3.2.1 Banks' interconnectedness with OFIs

Banks' exposures to, and use of funding from, OFIs varied significantly across jurisdictions. While some jurisdictions reported similar sizes for banks' exposures to and use of funding from OFIs, large differences among the two are observed in other jurisdictions (Exhibit 3-4). In 2017 banks' use of funding from OFIs and banks' exposure to OFIs increased in just over half of the jurisdictions.

Banks' interconnectedness with OFIs[1]

At end-2017

Exhibit 3-4



[1] Jurisdictions that provided data on banks' use of funding from OFIs, net of prudential consolidation are AU, CL, ES, ID, IT, KY, LU, MX, NL, SG, UK. Jurisdictions that provided data on banks' exposures to OFIs, net of prudential consolidation are AU, CA, CL, ES, ID, IT, LU, MX, NL, SA, SG, UK. [2] Banks' liabilities to OFIs as a share of bank assets. This figure is not available for HK. [3] Banks' exposures to OFIs as a share of banks' assets.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Starting on the asset side of bank balance sheets, banks' exposures to OFIs were below 5% of bank assets in the majority of jurisdictions, but made up over 10% of bank assets in Belgium and Ireland. These exposures to OFIs can be further disaggregated to specific OFI entity types (ie MMFs, other investment funds, finance companies, broker-dealers and SFVs) where data were available (Exhibit 3-5). Banks' exposures remained below 2% of total bank assets for MMFs, other investment funds and broker-dealers. However, exposures to finance companies and SFVs were generally much larger.[55]

[53] The sample of jurisdictions reporting data on the interconnectedness between banks and OFIs increased in the 2018 monitoring exercise. The results presented here are based on historical data included in jurisdictions' 2018 submissions and are therefore not directly comparable to the results from the 2017 monitoring exercise.

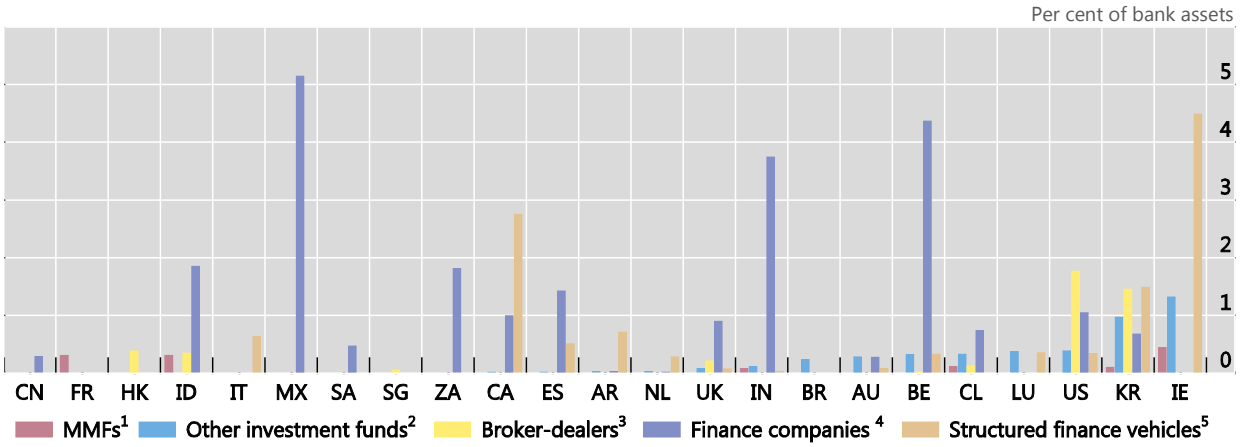
[54] See Exhibit 3-1 for the definition and interpretation of these interconnectedness measures.

[55] In cases where data net of prudential consolidation are not available this could include intragroup connections.

Banks' exposures to selected OFI entity types

At end-2017

Exhibit 3-5



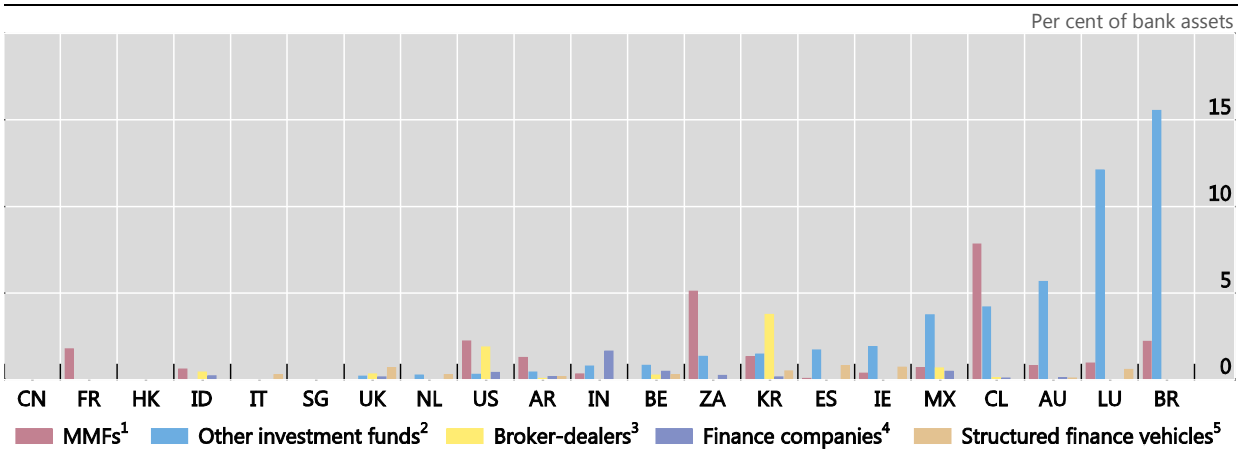
[1] Banks' exposure to MMFs as a share of bank assets. [2] Banks' exposure to other investment funds (equity, fixed income and mixed funds) as a share of bank assets. [3] Banks' exposure to broker-dealers, net of prudential consolidation when available, as a share of bank assets. [4] Banks' exposure to finance companies, net of prudential consolidation when available, as a share of bank assets. [5] Banks' exposure to SFVs, net of prudential consolidation when available, as a share of bank assets.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Banks' use of funding from selected OFI entity types

At end-2017

Exhibit 3-6



[1] Banks' liabilities to MMFs as a share of bank assets. [2] Banks' liabilities to other investment funds (equity, fixed income and mixed funds) as a share of bank assets. [3] Banks' liabilities to broker-dealers, net of prudential consolidation when available, as a share of bank assets. [4] Banks' liabilities to finance companies, net of prudential consolidation when available, as a share of bank assets. [5] Banks' liabilities to SFVs, net of prudential consolidation when available, as a share of bank assets.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Moving to the liability side of banks' balance sheets, banks' use of funding from OFIs was below 10% of total bank assets in most jurisdictions (Exhibit 3-4). Generally, as OFIs have grown in recent years, so has the degree to which they provide funding to banks. Exhibit 3-6 shows banks' reported use of funding from MMFs, other investment funds, broker-dealers, finance companies and SFVs. Other investment funds were the primary source of bank funding from OFIs in Brazil,[56] Luxembourg,[57] Australia and Mexico. In Chile and South

[56] For a discussion of bank funding from investment funds in Brazil, see Box 3-3 in FSB (2018a).

[57] In Luxembourg, this is primarily due to investment funds' operational deposits at their custodian banks. These operational deposits are the non-invested part of the fund's assets and are necessary for the fund to remain

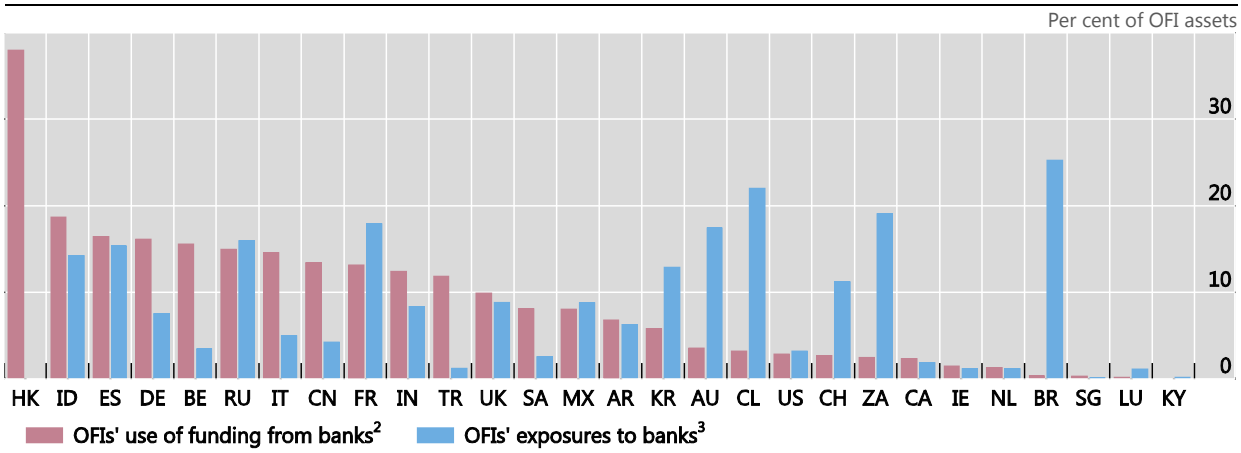
Africa, bank funding obtained from MMFs exceeded the funding that banks obtained from other investment funds.

3.2.2 OFIs' interconnectedness with banks

OFIs' interconnectedness with banks[1]

Exhibit 3-7

At end-2017



[1] Some jurisdictions' exposure and funding links between banks and OFIs reflect the provision of data gross of prudential consolidation whereas other jurisdictions provided data net of prudential consolidation (ie a substantial part of this exposure reflects bank activity with related OFIs within a conglomerate). Jurisdictions that provided data on OFIs' use of funding from banks, net of prudential consolidation are AU, CA, CL, ES, ID, IT, LU, MX, NL, SA, SG, UK. Jurisdictions that provided data on OFIs' exposures to banks, net of prudential consolidation are AU, CL, ES, ID, IT, KY, LU, MX, NL, SG, UK. [2] OFIs' liabilities to banks as a share of OFI assets. [3] OFIs' exposures to banks as a share of OFI assets. This figure is not available for HK.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Interconnectedness can also be analysed from the OFIs' perspective to show the relative importance of these interlinkages for OFIs. OFIs' interconnectedness with banks (Exhibit 3-3, RHS panel) is effectively the mirror image of banks' interconnectedness with OFIs (Exhibit 3-3, LHS panel).[58] In some jurisdictions where the banking sector is relatively large, these linkages tend to be more important to OFIs than to banks. Measured as a fraction of OFI assets, in 2017 OFI use of funding from banks increased slightly from 6.1% to 6.2% of OFI assets, while OFIs' exposures to banks decreased slightly from 6.4% to 6.3%. OFIs' exposures to banks make up over 20% of total OFI assets in two jurisdictions (Brazil and Chile), and above 15% in five others (Australia, France, Russia, South Africa and Spain) (Exhibit 3-7).

OFI funding from banks remains significant in a number of jurisdictions, at over 10% of total OFI financial assets in eleven jurisdictions and over 15% of total OFI financial assets in five of these jurisdictions (Hong Kong, Indonesia, Spain, Germany and Belgium). Banking sectors are central to some of these financial systems and thus are a key source of OFI funding.[59]

operational. As custodian banks are not credit-driven, this cash is not invested on the banks' assets side, but is rather placed on a short-term basis at the central bank or other banks, leading to very low credit-to-deposit ratios.

58 This section uses the same data as in Section 3.2, but divides by the assets of OFIs rather than banks (see Box 3-1).

59 On potential financial stability implications of leverage or use of funding from banks by certain investment funds or other non-bank financial institutions, see for example FSB (2017a).

3.3 Interconnectedness of insurance corporations and pension funds to OFIs

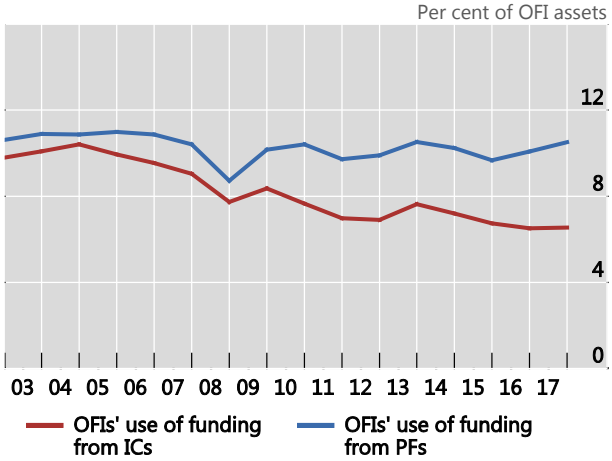
Insurance corporations and pension funds typically do not obtain significant funding from OFIs (Exhibit 3-8, RHS), though they tend to lend to or invest in OFIs. OFI exposures to insurance corporations exceed OFI exposures to pension funds. In contrast, OFI use of funding from pension funds continued to exceed the use of funding from insurance corporations in 2017, which has been declining over the past several years (Exhibit 3-8, LHS).

Interconnectedness between OFIs, insurance corporations and pension funds

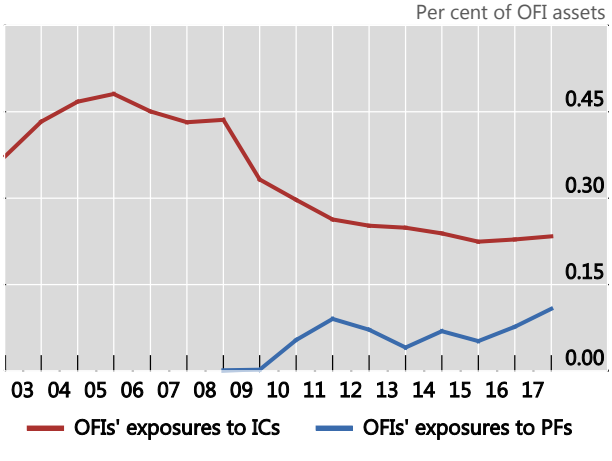
29-Group[1]

Exhibit 3-8

OFIs' use of funding[2]



OFIs' exposures[3]



[1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). [2] OFIs' use of funding from ICs = OFIs' liabilities to insurance corporations as a share of OFI assets. OFIs use of funding from PFs = OFIs' liabilities to pension funds as a share of OFI assets. [3] OFIs' exposure to ICs = OFIs' claims on insurance corporations as a share of OFI assets. OFIs exposure to PFs = OFIs' claims on pension funds as a share of OFI assets.

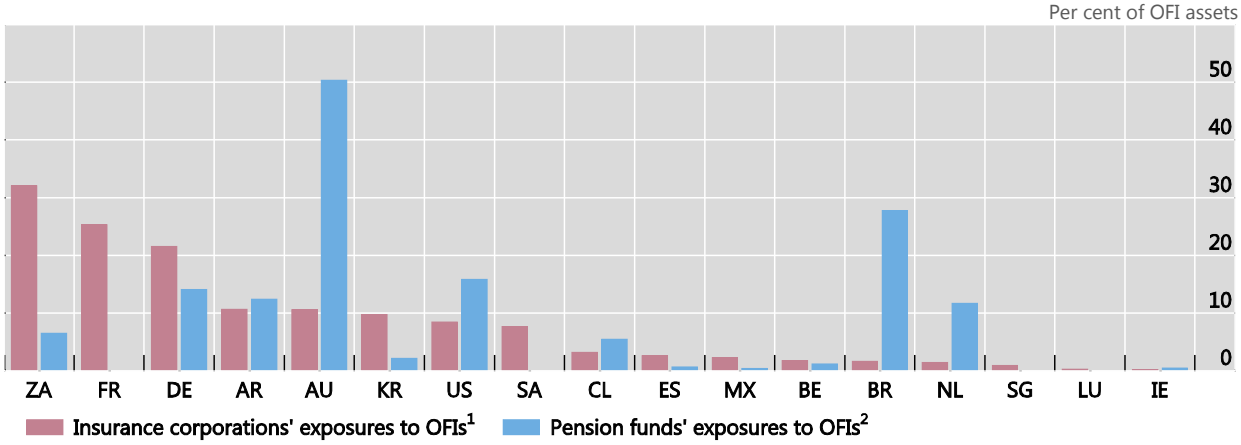
Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

3.3.1 OFI interconnectedness with insurance corporations and pension funds

Insurance corporations and pension funds: Interconnectedness with OFIs

At end-2017

Exhibit 3-9



[1] Insurance corporations' claims on OFIs as a share of OFI assets. [2] Pension funds' claims on OFIs as a share of OFI assets. This figure is not available for SA and was reported as zero by FR and SG.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

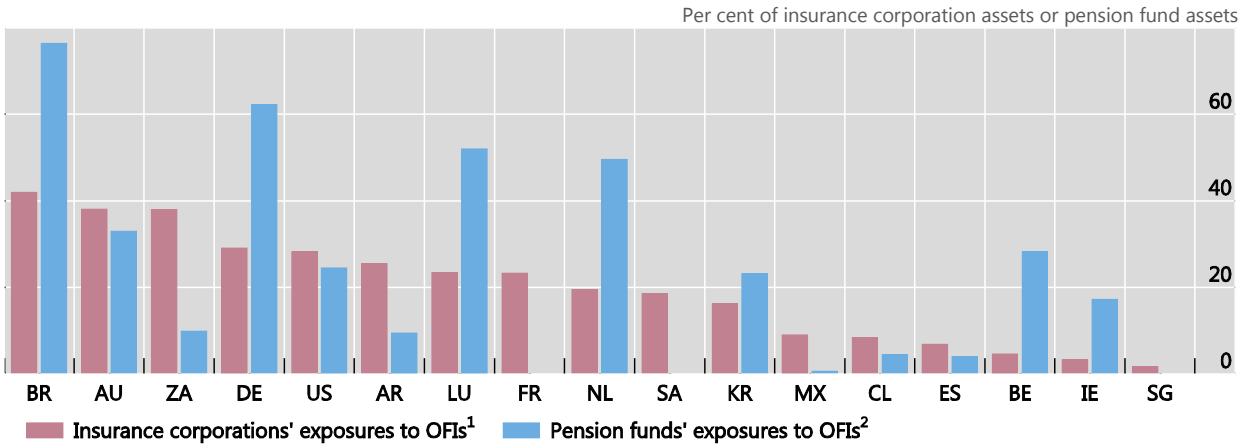
OFI exposures to insurance corporations and pension funds differ among jurisdictions. For example, pension funds' exposures to OFIs as a percentage of OFI assets are relatively large in Australia and Brazil, while insurers' exposures to OFIs were relatively large in South Africa, France and Germany (Exhibit 3-9).

3.3.2 Insurance corporations and pension funds interconnectedness with OFIs

Pension funds are relatively more exposed to OFIs in Brazil, Germany, Luxembourg and the Netherlands, with the exposures exceeding 40% of pension fund assets (Exhibit 3-10). Insurance corporations, in contrast, have relatively smaller exposures to OFIs as a percentage of insurance corporations' assets, with the majority of linkages below 30% of insurers' assets.

Insurance corporations and pension funds: Interconnectedness with OFIs
At end-2017

Exhibit 3-10



[1] Insurance corporations' claims on OFIs as a share of insurance corporations' assets. [2] Pension funds' claims on OFIs as a share of pension funds' assets. This figure is not available for SA, and was reported as zero by FR and SG.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

A relatively high degree of interconnectedness between insurance corporations, pension funds and OFIs can develop for a number of reasons. In recent years, a significant portion of this funding has reflected the investments of insurance corporations' and pension funds in funds, rather than direct lending. Nonetheless, disruptions in the funding provided by insurance corporations or pension funds to certain OFIs could lead to some funding pressure on these OFIs and, in turn, to the funding that OFIs provide to other sectors.

Indirect interconnectedness - Portfolio overlap in the euro area[60] **Box 3-1**

Interconnectedness among financial sectors can be *direct,* as analysed in Section 3 of this Report, or *indirect*. Portfolio overlap is an example of indirect interconnectedness on the asset side of sectoral balance sheets. In this Box, portfolio overlap among financial intermediaries in the euro area is measured by calculating the degree to which financial intermediaries hold the same securities in their respective portfolios, identified by the

[60] This box was prepared by Nick Bootsma, Peter Wierts, Iman van Lelyveld and Justus Inhoffen (De Nederlandsche Bank (DNB)).

international securities identification number (ISIN). This measure of portfolio overlap focuses solely on the asset side of balance sheets and may provide insight into potential transmission channels related to asset price shocks.[61]

The Securities Holdings Statistics by Sector (SHS-S) dataset, collected by the European System of Central Banks, is well suited to measure portfolio overlap, given that it covers 83% euro-denominated securities issued in euro area jurisdictions.[62] Holdings are only reported by the sector buying the securities, to avoid double-reporting. The portfolio overlaps between the investment fund, pension fund, insurance, MMF and bank (monetary financial institution (MFI)) sectors are calculated in the euro area, using four types of aggregated securities (ie short-term debt, long-term debt, equities and fund shares). To construct the portfolios, each sector's security holdings across all euro area jurisdictions are aggregated.

Equation 1 describes how the total portfolio overlap percentage is computed from ISIN-level security holdings, and incorporates the following characteristics.[63] The portfolio overlap between sectors X and Y, *ovlp(X,Y)* measures the extent to which sector X invests in the same securities as sector Y. This measure is asymmetric as sector X's portfolio can overlap more or less with sector Y's portfolio than vice versa. Thus for each sector pair, the overlap of one sector's portfolio with the portfolio of the other sector is calculated, and vice versa. Also, any sector's portfolio can never overlap more than 100% with the portfolio of another sector, thus the portfolio overlap measure is bounded by 100%.

$$ovlp(X,Y) = \sum_{i=1}^{N} \min\left(\frac{X_i}{Y_i}, 1\right) \cdot \frac{Y_i}{\sum_{i=1}^{N} Y_i} \qquad (1)$$

Exhibit 3-11 presents the degree of portfolio overlap between euro area sectors. Arrow thickness indicates the extent to which one sector's portfolio overlaps with the portfolio of another sector. A thicker arrow from sector X to sector Y, indicates that more of Y's portfolio is also held in the portfolio of sector X.

Exhibit 3-11 shows that investment funds have higher portfolio overlap with the other sectors, than other sectors overlap with investment funds, except for the insurance sector. The largest overlap indicates that 44% of the pension funds' portfolio is also held in the portfolio of investment funds.

Exhibit 3-12 displays the euro area investment fund sector's portfolio overlap with the portfolios of other sectors over time, and reveals that the overlap has remained fairly constant since end-2013. The fairly high overlap between euro area sectors, specifically the investment fund sector, suggests potential for indirect contagion for example through fire sales of securities. These results suggest that SHS-S data are useful for studying portfolio overlap across sectors and jurisdictions in the euro area and that similar data sources may also be useful in other jurisdictions.

---

61 The measure for portfolio overlap presented in this Box is inspired by the measure proposed by Wang et al (2018). Note that the data would also allow for analysis of funding overlaps.

16 ECB (2015).

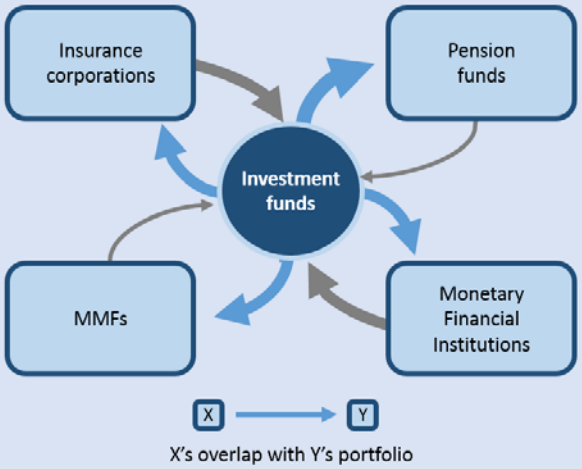
63 Here X_i and Y_i represent the investments of each respective sector in security $ISIN_i$, denoted in euros. The asymmetry of the measure means that $ovlp(X,Y) \neq ovlp(Y,X)$, and the fact that overlap is bounded by 100% is reflected by the $\min(\frac{X_i}{Y_i}, 1)$ component in Equation 1.

Investment fund portfolio overlap in the euro area

Exhibit 3-11

Quarter 1, 2018

OFIs' use of funding



OFIs' exposures

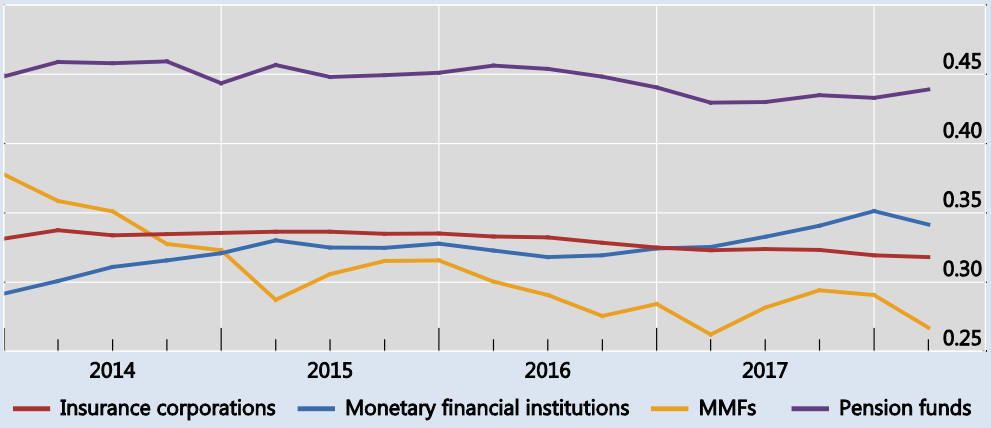
Other sectors	$ovlp(INV, other)$[1]	$ovlp(other, INV)$
Pension funds	44%	9%
MMFs	27%	2%
Insurance corporations	32%	33%
Monetary financial institutions	34%	25%

[1] $ovlp(INV, other)$ indicates the degree to which holdings of the investment fund sector are also held in the portfolios of the *other* sector.

Portfolio overlap between investment funds and other sectors in the euro area

Exhibit 3-12

Per cent of other sector's portfolios



3.4 Cross-border interconnectedness (exposures to the rest of the world)

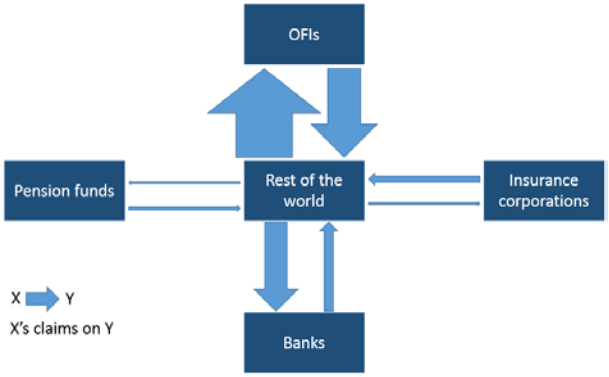
High-level cross-border interconnectedness data (exposures and funding) were collected from the financial sectors of each jurisdiction (eg banks, OFIs, insurance corporations and pension funds). While this dataset has improved,[64] gaps remain and thus there is a need for further improving data availability. Nevertheless, some preliminary observations can be made, including that OFIs and banks display material cross-border linkages (Exhibit 3-13, LHS).

[64] In FSB (2017c) for the G20 Summit in Hamburg, FSB member authorities agreed to improve the granularity of the cross-border "Rest of World" category to understand the interconnectedness of bank and non-bank sectors across jurisdictions.

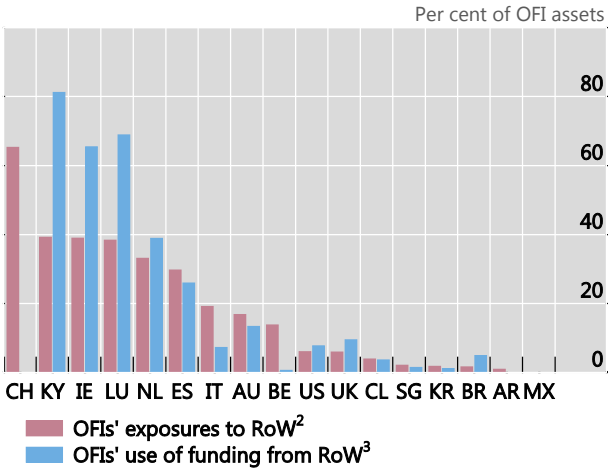
Cross border interconnectedness

Exhibit 3-13

Aggregate exposures between financial intermediaries and the rest of the world (RoW)[1]



OFIs' cross-border interconnectedness, at end-2017



[1] RoW exposure is the aggregate cross-border exposures reported by 21 jurisdictions and the euro area, where data were available. This exhibit illustrates high-level observations from the analysis of the cross-border linkages of OFIs, pension funds and insurance corporations. The thickness of the arrows reflects the absolute size of the cross-border exposures from a certain financial sector. [2] OFIs' exposures to the rest of the world as a share of OFI assets. [3] OFIs' liabilities to the rest of the world as a share of OFI assets. This figure is not available for CH, and was reported as zero by AR and MX.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

In aggregate US dollar terms, the cross-border linkages of OFIs exceeded the cross-border linkages of banks. OFI sectors in the Cayman Islands, Ireland, Luxembourg and the Netherlands – jurisdictions that serve as hubs for international capital flows – have relatively high levels of cross-border interconnectedness, with cross-border investment into OFIs (ie OFIs use of cross-border funding) exceeding cross-border exposure of OFIs. (Exhibit 3-13, RHS).

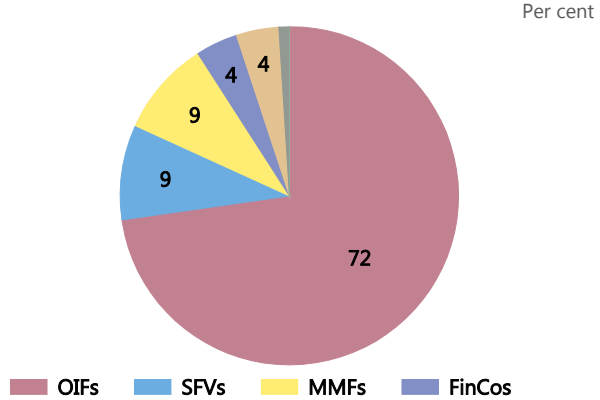
Most of these linkages seem to occur through investment funds – primarily with other investment funds (Exhibit 3-14), including funds in one jurisdiction investing in funds in another jurisdiction.

OFI entity types' cross-border interconnectedness

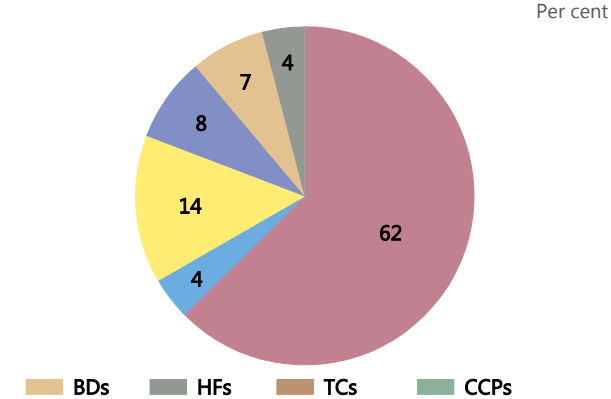
29-Group at end-2017[1]

Exhibit 3-14

RoW claims on OFIs



RoW liabilities to OFIs



BDs = Broker-dealers; FinCos = Finance Companies; HFs = Hedge funds; OIFs = Other investment funds; TCs = Trust companies. [1] Measured as a percentage of total RoW linkages, where reported.

Sources: Jurisidctions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

4. The narrow measure of NBFI

The classification of non-bank financial entities into one or more of the FSB's five economic functions ("EFs") is conducted by the relevant authorities in the jurisdiction based on the common guidance developed and agreed upon by participating jurisdictions.

This section describes the narrow measure of NBFI based on the submissions for the 2018 monitoring exercise. It begins by describing the FSB's process for obtaining the narrow measure according to the five EFs (or activities).[65] It then provides an overview of global and regional trends for the overall narrow measure. Finally, it provides an assessment of the trends in, and financial stability risks that may be posed by, each of the five EFs (see Box 4-1 for discussion of the metrics used to describe these risks).[66]

4.1 Narrowing down towards an activity-based measure of NBFI

The FSB's monitoring methodology involves two steps. The first step casts the net wide to capture an aggregate measure of all NBFI, the monitoring universe of non-bank financial intermediation (MUNFI). MUNFI comprises insurance corporations, pension funds, OFIs and financial auxiliaries. The second step narrows the focus to non-bank financial entities involved in credit intermediation that may pose risks to financial stability (through liquidity/maturity transformation and/or leverage), resulting in the FSB's "narrow measure" of NBFI. This step is undertaken by classifying a subset of entities that comprise MUNFI into five EFs. This narrow measure is based on the August 2013 FSB Policy Framework (Exhibit 4-1). Some entity types may be classified into more than one EF.[67]

To implement this EF (or activity)-based approach to monitoring NBFI, authorities consider non-bank financial entities' business models, activities and associated bank-like risks that may be posed to financial stability, and classify the relevant entity types into one or more of the five EFs, as they are defined in the FSB Policy Framework. They exclude entities that are either: (i) not typically part of a credit intermediation chain; or (ii) part of a credit intermediation chain, but are not involved in significant maturity/liquidity transformation and/or leverage. The approach incorporates authorities' supervisory judgement (or qualitative information) given that data are sometimes not available.[68] Each EF contains a number of different entity types, and the financial stability risks posed by different entity types, and within an entity type, may differ. For example, within EF1 (Management of

---

[65] The narrow measure also includes an unallocated category, which captures OFIs that the relevant authorities assessed to be involved in bank-like financial stability risks from NBFI, but which could not be assigned to a specific EF.

[66] The Experts Group periodically assesses the effectiveness of these metrics as measures of the underlying risks.

[67] In those few cases where an entity type was classified into more than one EF, its value was proportionately allocated between the EFs into which it was classified so as to only count once towards the jurisdiction's narrow measure.

[68] The inclusion of non-bank financial entities or activities in the narrow measure is based on a conservative assessment of potential risks to financial stability on a pre-mitigant basis and does not constitute a judgement that policy measures applied to address the financial stability risks from NBFI of these entities and activities are inadequate or ineffective. In a number of cases, the assessment may be conservative (ie inclusive) so as to help enhance consistency across jurisdictions. The Experts Group regularly reviews the composition of the narrow measure in light of better data and analysis. For example, the narrow measure currently includes certain types of MMFs, such as US treasury MMFs with specific structural features, that may warrant more thorough discussion in the EF-based approach.

collective investment vehicles with features that make them susceptible to runs), the degree of run risk may vary between different types of MMFs, in particular following recent regulatory reforms.

The FSB employs a process of review and discussion among participating jurisdictions to help enhance consistency in the classification of entities/activities and shed light on new issues.[69] Achieving consistency of EF classification is an iterative process, reflecting both improvements in data availability and in the assessment of non-bank financial entities' involvement in the different EFs as authorities learn from collective information-sharing in successive exercises. At the same time, new developments in financial markets result in additional areas in which guidance may be needed. Additional refinement to the FSB's classification guidance will help further improve accuracy and consistency in the relevant authorities' assessments going forward, especially as financial entities often provide their services across several jurisdictions.

Classification by Economic Functions (EFs) Exhibit 4-1

EF	Definition	Typical entity types[70]
EF1	Management of collective investment vehicles with features that make them susceptible to runs	MMFs, fixed income funds, mixed funds, credit hedge funds,[71] real estate funds
EF2	Loan provision that is dependent on short-term funding	Finance companies, leasing/factoring companies, consumer credit companies
EF3	Intermediation of market activities that is dependent on short-term funding or on secured funding of client assets	Broker-dealers, securities finance companies
EF4	Facilitation of credit creation	Credit insurance companies, financial guarantors, monolines
EF5	Securitisation-based credit intermediation and funding of financial entities	Securitisation vehicles, structured finance vehicles, asset-backed securities

The relationship between MUNFI ($185.0 trillion for the *29-Group*) and the EF-based narrow measure presented in this section ($51.6 trillion) is illustrated in Exhibit 4-2 and Annex 1. Obtaining the narrow measure involved the following steps:

(i) *Insurance corporations, pension funds, financial auxiliaries and certain OFIs not classified into any of the five EFs* are excluded. These entities, which do not tend to directly engage in credit intermediation or have been assessed as not being involved in liquidity/maturity transformation, leverage, and/or imperfect credit risk transfer, totalled $122.3 trillion at end-2017. Examples of OFIs not classified into any EFs in the 2018 monitoring exercise are listed in Annex 3.

[69] The 2015-16 shadow banking peer review also stressed the importance of resolving material differences of view, thereby promoting greater consistency in the classification of non-bank financial entities. See Box 4-1 of FSB (2017b).

[70] The FSB Policy Framework acknowledges that the narrow measure may take different forms across jurisdictions due to different legal and regulatory settings as well as the constant innovation and dynamic nature of the non-bank financial sector. It also enables authorities to capture new structures or innovations that may create financial stability risks from NBFI, by looking through to their underlying economic functions and risks. Thus, the entity types listed should be taken as typical examples. For details, see FSB (2013).

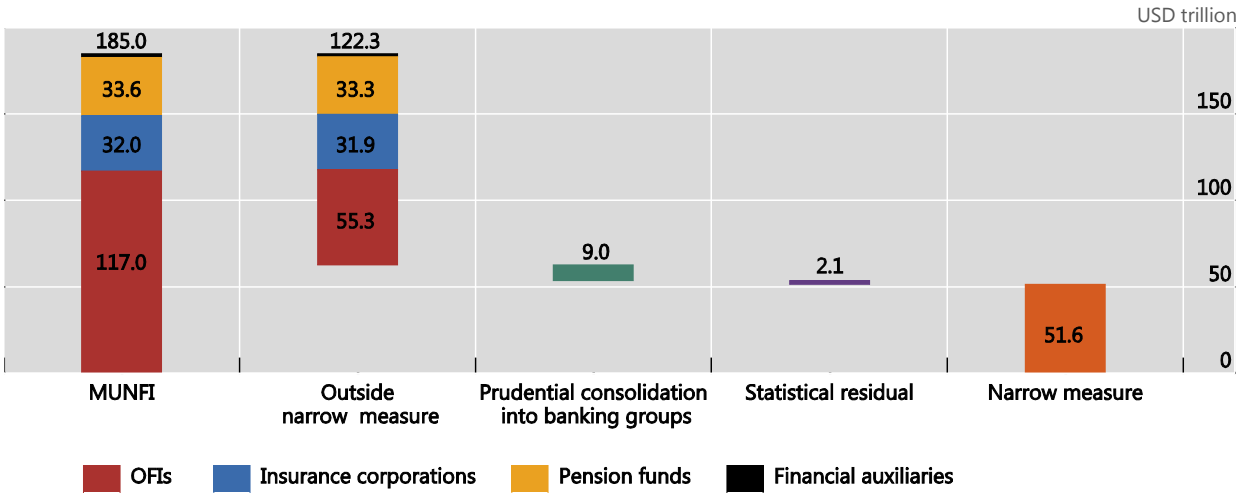
[71] Credit hedge funds are hedge funds that invest primarily in credit assets (eg bonds, loans).

(ii) *Entities prudentially consolidated into banking groups are excluded*. These entities are already subject to prudential regulation and supervision (ie Basel II/III framework), including for maturity/liquidity transformation, leverage, and imperfect credit risk transfer, and are therefore excluded from the narrow measure.[72] These banking group consolidated entities typically include bank-owned/affiliated broker-dealers, finance companies and SFVs. Self-securitisation (or retained securitisation) assets are also excluded from the narrow measure, as under prudential consolidation rules they are treated as banking groups' own assets.[73] The amount of prudentially consolidated assets, including self-securitisation, as of end-2017 was $9.0 trillion.

Moving from MUNFI to the narrow measure

29-Group at end-2017

Exhibit 4-2



Prudential consolidation into banking groups = assets of classified entity types which are prudentially consolidated into a banking group; Statistical residual = reported residual OFIs generated by the difference between total OFI financial assets and the sum of all known sub-sectors therein.

Sources: Jurisdictions' 2018 submissions (national sector balance sheet and other data); FSB calculations.

(iii) The *statistical residual* category, consisting of residuals generated in some jurisdictions' national financial accounts (NFA), is excluded from the narrow measure. These residuals are the difference between a jurisdiction's total OFI financial assets, as they are published in sectoral balance sheet statistics, and the sum of all known sub-sectors therein. While in theory this residual should be zero, in practice it is quite large in some jurisdictions. This may be the consequence of inconsistencies between "top-down" NFA estimations and "bottom-up" coverage of OFI sub-sectors, as well as challenges in aligning these two approaches, and differences in data granularity. These residuals totalled $2.1 trillion at end-2017 (1.8% of total OFI financial assets). As a result of efforts by jurisdictions to reduce the size of the residual for the 2018 monitoring exercise, in particular the UK, the residual is almost 30% lower than in the 2017

[72] Entities that are not prudentially consolidated into banking groups, but are individually subject to Basel-equivalent regulation, are not excluded from the narrow measure in this step.

[73] Self-securitisation/retained securitisation vehicles take loans from a bank and turn these into debt securities to be used by the same bank as collateral, should the need arise, for accessing central bank funding.

monitoring exercise, when it totalled $2.8 trillion.[74] While further understanding of the identified residuals is needed going forward, the narrow measure excludes these residuals, given uncertainty about the actual entities/activities included in this residual, and in order to avoid major inconsistencies across jurisdictions.[75]

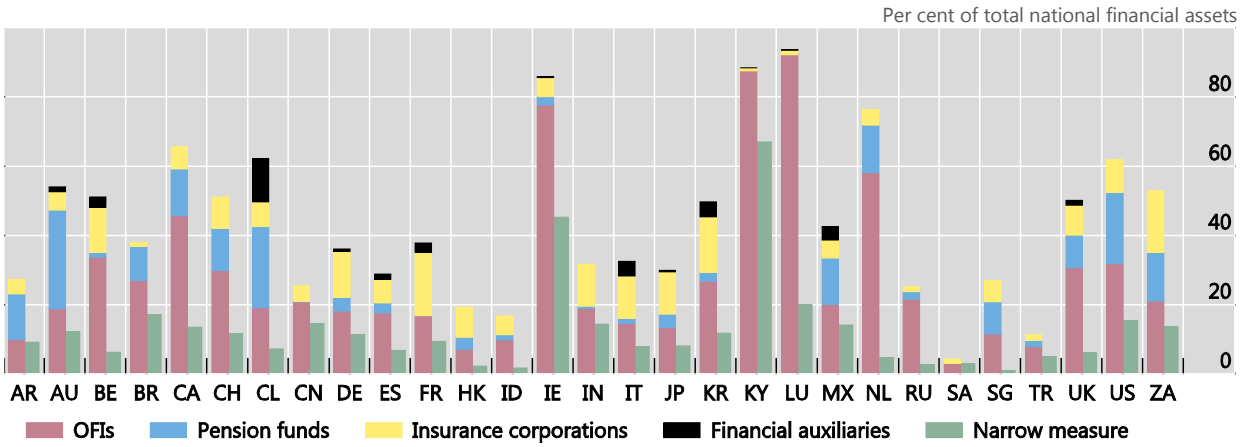
The resulting narrow measure was $51.6 trillion at end-2017. This represents approximately 28% of MUNFI (all NBFI), which is similar in magnitude as in the 2017 monitoring exercise.[76] The narrow measure grew by 8.5% in 2017, compared to a 7.1% growth rate for MUNFI. In addition to the five EFs, the narrow measure also includes about $2.0 trillion of assets which capture an "unallocated" category. Authorities in some jurisdictions did not clearly assign certain non-bank financial entities to a specific EF, but either assessed these entities to be involved in credit intermediation or could not determine that they should be excluded from the narrow measure.[77]

The narrow measure as a share of MUNFI varied significantly across jurisdictions, ranging from 3.3% to 75.9%, with the narrow measure comprising on average 27.9% of MUNFI. Exhibit 4-3 compares MUNFI to the narrow measure based on EFs by jurisdiction, with each displayed as a percentage of total national financial assets.

MUNFI and the narrow measure by jurisdiction

Exhibit 4-3

29-Group at end-2017



Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

[74] The UK Office for National Statistics (ONS), the Bank of England (BoE) and the Financial Conduct Authority are engaged in an initiative to improve the granularity and coverage of the UK's Flow of Funds data. As a result of this work, a substantial part of the UK's statistical residual was observed to consist of captive financial institutions (CFIML). For example, see ONS (2018).

[75] Residuals were reported by Germany, Ireland, Italy, Japan, the Netherlands, Russia, and Switzerland. The $2.1 trillion includes assets of OFIs that were neither classified into the narrow measure nor identified by jurisdictions as being outside the narrow measure. However, if conservatively assessed, this statistical residual of $2.1 trillion may be added to the $51.6 trillion of identified narrow measure. The statistical residual should be distinguished from the unallocated category described below, through which authorities included entities in the narrow measure that could not clearly be assigned to a specific EF.

[76] As a result of the progress made in each monitoring exercise, these figures may not be strictly comparable with those published in previous Reports.

[77] Over time the size of this unallocated NBFI category should ideally decrease as authorities, with better data and analysis, will be able to classify them into one of the five EFs or exclude them from the narrow measure.

4.2 Narrow measure trends

4.2.1. Global trends

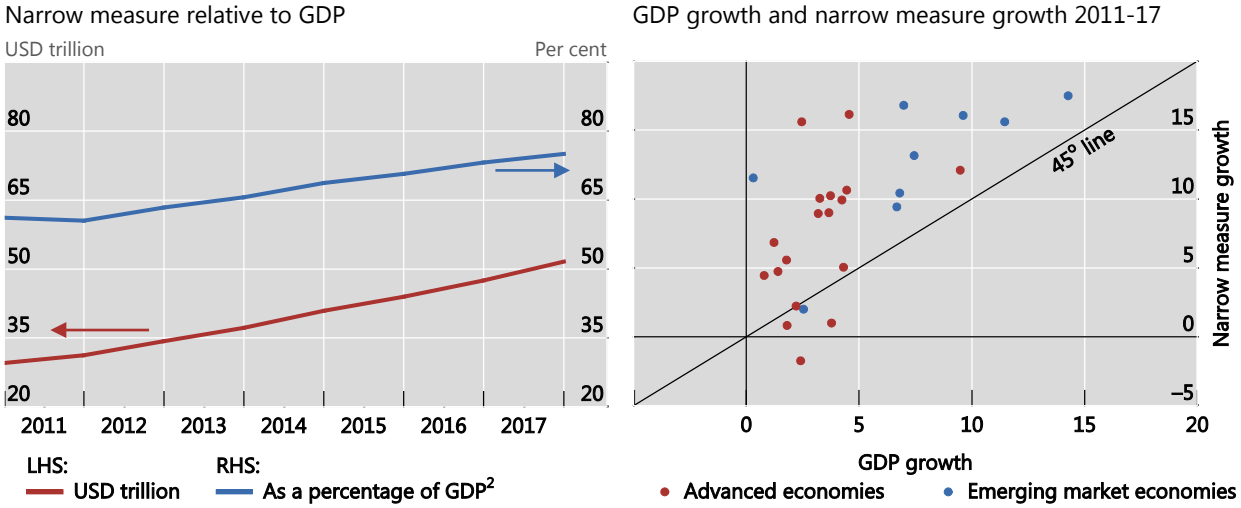
The total financial assets of entities in the narrow measure grew in 2017 (8.5%), both in absolute terms and relative to GDP (Exhibit 4-4). This growth rate is consistent with the average annual growth rate (8.8%) of the narrow measure over 2011-16.[78] This average growth rate was mainly driven by the Cayman Islands, China, Ireland and Luxembourg, which together accounted for 67% of the dollar value increase since 2011. Over the same period, only Belgium saw its narrow measure decrease, which was largely due to a decline in SFV assets. In the years since the financial crisis, growth of the narrow measure has been driven primarily by investment funds, as opposed to pre-crisis growth, which was driven to a large degree by entity types such as SFVs and other off-balance sheet funding vehicles (or conduits) that often received support from banks.

The narrow measure has grown from 61% of all participating jurisdictions' GDP in 2011 to 75% in 2017.[79] As indicated by the dots above the 45°-line in the right panel of Exhibit 4-4, the narrow measure grew somewhat faster than GDP since 2011 in most of the 29 jurisdictions. Strong growth in the narrow measure reflects that EMEs, in particular, have seen increases in the provision of financial services, albeit from a low base. As a share of total global financial assets, the narrow measure has increased slightly from about 11.7% in 2011 to 13.7% at end-2017 for the 29 jurisdictions.

Narrow measure and GDP[1]

Exhibit 4-4

29-Group



[1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). Due to data gaps, China's growth rate is based on data from 2013-17; Hong Kong's growth rate is based on data from 2012-17; and Russia's growth rate is based on data from 2014-17. [2] As a weighted average based on rolling GDP weights.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); IMF *World Economic Outlook*; FSB calculations.

[78] Growth rates have been calculated based on historical data included in jurisdictions' 2018 submissions. In some cases, particularly prior to 2011, changes in the value of cross-jurisdiction aggregates may also reflect improvements in the availability of data over time at a jurisdictional level.

[79] Using the same dataset, the narrow measure was around 65.0% of GDP in 2008, although this understates the true size of the narrow measure relative to GDP at this time due to historical data gaps.

4.2.2 Developments across jurisdictions

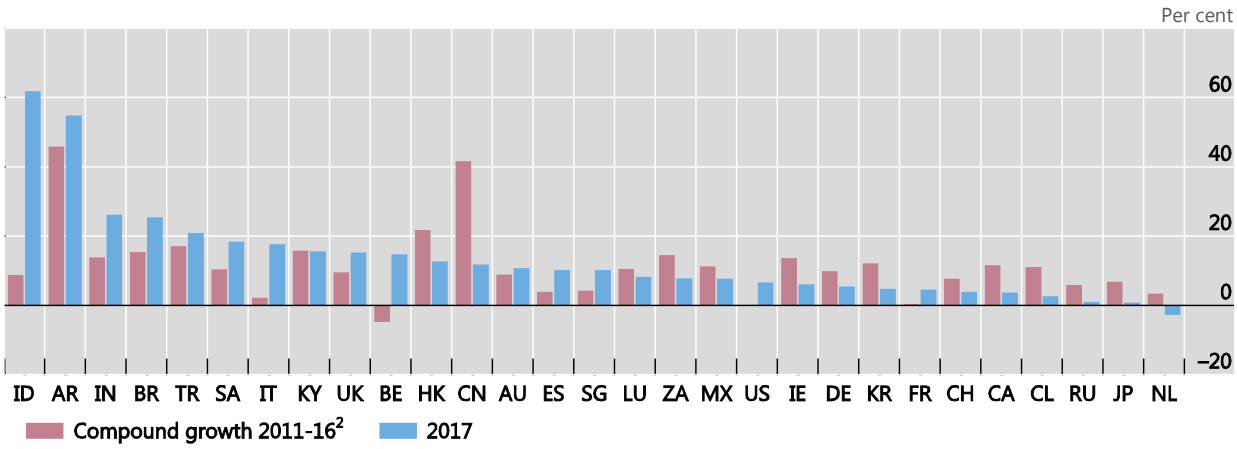
The relative size and recent evolution of the narrow measure of NBFI varies substantially across jurisdictions (Exhibits 4-5 and 4-6). As in previous years, the US had the largest narrow measure, at $14.9 trillion in 2017, representing 28.9% of narrow measure assets reported by the 29 jurisdictions (Exhibit 4-6). The eight participating euro area jurisdictions comprised the next largest share (with a combined $11.8 trillion, 23.0%), followed by China ($8.2 trillion, 16.0%),[80] the Cayman Islands ($5.4 trillion, 10.4%), and Japan ($2.9 trillion, 5.6%). Compared to 2013, the US share of the narrow measure has declined, whereas China's share and the UK's share have increased over the same period.

Only one jurisdiction, the Netherlands, saw the dollar value of its narrow measure decrease in 2017, due to declines in EF1 and EF5. Thirteen jurisdictions experienced an increase of over 10% (Exhibit 4-5), and five jurisdictions saw their narrow measure increase by over 20% (Argentina, Brazil, India, Indonesia and Turkey). However, for most of the five jurisdictions, the increase reflects base effects and/or relatively high inflation rates.[81]

Annual growth of the narrow measure[1]

By jurisdiction

Exhibit 4-5



[1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). Growth rates in Argentina reflect a high rate of inflation. [2] Growth rates for China are from 2013-16, for Hong Kong are from 2012-16 and for Russia are from 2014-16.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

[80] The business models and risk profiles of non-bank financial entities in China are also unique. The narrow measure for China will be further refined in future monitoring exercises as more granular data become available and the Experts Group conducts further analysis.

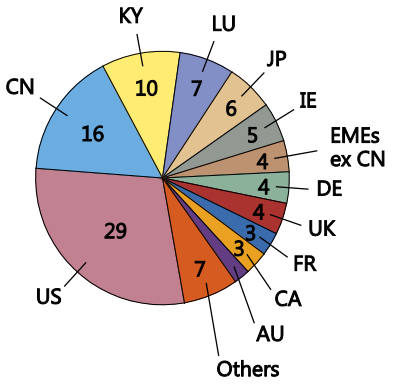
[81] The increase in Hong Kong's narrow measure is also due to changes in the data sample over time.

Share of total narrow measure, by jurisdiction

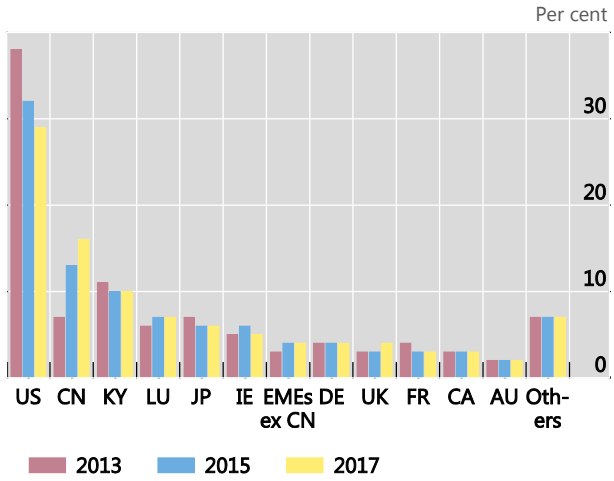
29-Group

Exhibit 4-6

At end-2017



Historical evolution of the shares by jurisdiction[1]



Others = BE, CH, ES, HK, IT, KR, NL and SG. [1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017).
Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

4.3 Composition of the narrow measure

Exhibit 4-7 details the size and recent growth of the narrow measure as well as its components, while Exhibit 4-8 illustrates the composition and growth of the narrow measure over time.[82] The individual EFs that comprise the narrow measure grew at different rates, with two EFs (*collective investment vehicles with features that make them susceptible to runs* (EF1) and *securitisation-based credit intermediation and funding of financial entities* (EF5)) growing at the highest rates (each at 9.1%).[83]

The narrow measure by economic function

29-Group

Exhibit 4-7

	Narrow measure	EF1	EF2	EF3	EF4	EF5	Unallocated[1]
Size at end-2017 (USD trillion)	51.6	36.7	3.5	4.2	0.2	5.0	2.0
Share of narrow measure (%)	100.0	71.2	6.7	8.2	0.3	9.6	4.0
Growth in 2017 (year-over-year, %)	8.5	9.1	5.8	5.2	4.4	9.1	9.7
Growth 2011-16 (annualised growth, %)	8.8	13.2	-0.9	1.7	-7.3	0.5	7.1

Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). [1] Unallocated = assets of entities that were assessed to be involved in bank-like financial stability risks from NBFI, but which could not be assigned to a specific EF.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

[82] The results are not strictly comparable to those presented in previous Reports due to the addition of new jurisdictions, improvements in national sector balance sheet statistics, more granular reporting and revisions to historical data.

[83] The "unallocated" category grew by 9.7% in 2017, primarily driven by Ireland (due to the growth of non-securitisation SPVs) and the UK (due to the growth of financial auxiliaries).

While EF1 was the largest EF in most jurisdictions at end-2017, *loan provision that is dependent on short-term funding* (EF2) was the largest EF in India, Russia and Turkey. Meanwhile, *intermediation of market activities dependent on short-term funding* (EF3) was the largest EF in Hong Kong and Japan (Exhibit 4-9).

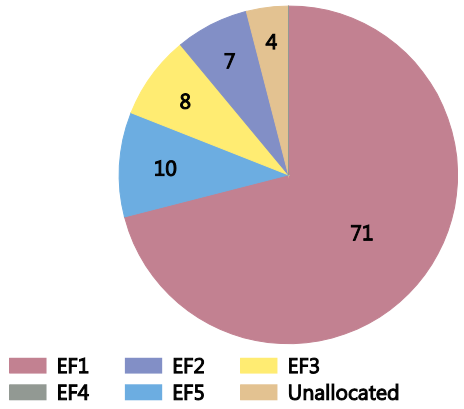
Classification by economic function[1]

29-Group

Exhibit 4-8

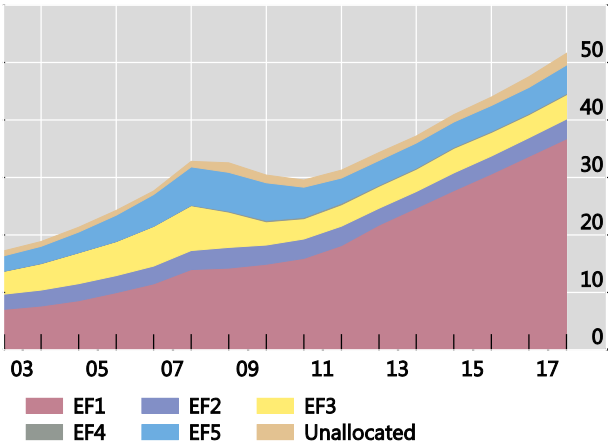
Relative size of economic functions at end-2017

Per cent



Evolution of the narrow measure by EF[2]

USD trillion



[1] Net of entities prudentially consolidated into banking groups. Unallocated = assets of entities that were included in the narrow measure, but which could not be assigned to a specific EF. [2] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017).

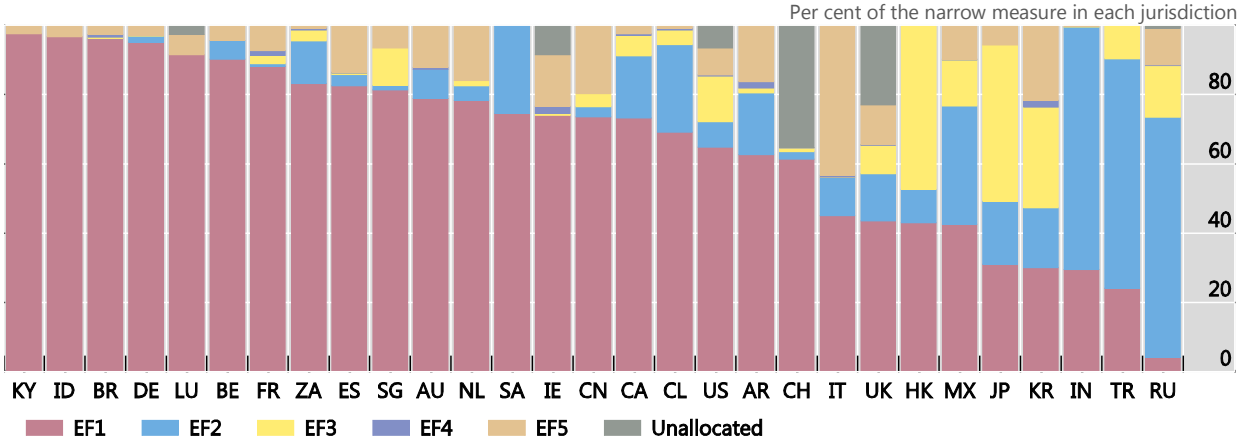
Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Economic function classification by jurisdiction[1]

At end-2017, by jurisdiction

Exhibit 4-9

Per cent of the narrow measure in each jurisdiction



Unallocated = assets of entities that were assessed to be involved bank-like financial stability risks from NBFI, but which could not be assigned to a specific economic function. [1] Net of entities prudentially consolidated into banking groups.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Financial stability risk metrics **Box 4-1**

To monitor and assess the potential risks to financial stability associated with the entity types classified into the different EFs, a set of on- and off-balance sheet data were collected in relation to: maturity transformation; liquidity transformation; imperfect credit risk transfer; and leverage.[84] These data were collected for both 2016 and 2017, in order to obtain insights on how potential financial stability risks associated with the entity types may be evolving. These data were also collected for the five largest entities within an entity type in a jurisdiction, to help understand how risks may be concentrated. Exhibit 4-10 provides an overview of collected on- and off-balance sheet items and calculated risk metrics.

Although the reporting of on-balance sheet data for classified entity types has improved compared to the 2017 monitoring exercise, gaps remain in reported data particularly in relation to off-balance sheet data.[85] Some jurisdictions continue to face significant challenges collecting these data, in part because regulatory data collection of various non-bank financial entities is not sufficiently granular, and sectoral balance sheet data often do not provide specific breakdowns with respect to maturity and liquidity factors.[86] In some cases, for particular entities and entity types, jurisdictions were not able to distinguish between their credit intermediation (and hence related risks) and their non-credit intermediation activities, which may affect the calculated risk metrics.[87] In addition to data gaps, differences in the accounting standards and the treatment of certain aspects of risk data also posed challenges in comparing financial stability risks posed by similar entity types in different jurisdictions.[88]

The sample size for calculating risk metrics represents national aggregates rather than individual entities. Thus, one jurisdiction's data submission of sector aggregates would typically include many individual entities that range from large to small entities. Due to data limitations, some of the exhibits and results presented in Sections 4.4-4.8 come from a sub-sample of jurisdictions and should therefore not be extrapolated to describe the entire sample of jurisdictions. More specifically, any conclusion from the data related to the sub-sample may not apply to all of the jurisdictions that are covered in this Report. However, to the extent possible, this Report discusses observations and trends that can be gleaned from the reported data.

---

84 For the largest three entity types classified into each EF (where assets exceed 1% of the total national financial assets), authorities were asked to report balance sheet items on a gross basis, ie reporting weighted averages of all entities making up a particular entity type. If gross reporting was not feasible, authorities reported the weighted averages of a sample pool (eg the largest three entities, by assets, for an entity type) for some entity types, or other relevant proxies.

85 For definitions of the balance sheet items used to compute risk metrics, please see the reporting templates that are published on the FSB website with this Report.

86 Where only some jurisdictions are able to provide risk metrics, the collected sample may reflect selection bias.

87 For example, some jurisdictions reported data for all funds, rather than only funds involved in credit intermediation. This may result, for example, in lower credit intermediation metrics.

88 For example, some risk metrics include data from entities prudentially consolidated into banking groups, as some jurisdictions' granular data do not distinguish between consolidated and non-consolidated entities. Also, some jurisdictions classified the equity assets of funds as long-term assets, while others treated them as short-term assets. There were also differences which arose for example because some jurisdictions reported total financial assets, while others reported total net assets for EF1 entities. This contributes to the challenges in comparing calculated risk metrics. The FSB, through the Experts Group, has been working on improving consistency and will continue to do so going forward.

The FSB will continue to advance the work on the risk analysis in future monitoring exercises, through focused work to refine risk metrics so that they are better tailored to the business models of the entities in each of the EFs. The FSB will also seek to make better use of widely available data, minimise the challenges presented by significant data gaps, and better assess the bank-like risks that NBFI may pose to financial stability.

On- and off-balance sheet items and risk metrics[1] Exhibit 4-10

Examples of risk metrics	Definition and range
Credit intermediation (CI) $CI1 = \frac{\text{credit assets}}{\text{total financial assets}}$ $CI2 = \frac{\text{loans}}{\text{total financial assets}}$	These metrics compare the amount of credit assets and loans held by a particular entity type to its total assets (**CI1** and **CI2**, respectively). As loan assets are part of wider credit assets, CI2 can be viewed as a sub-set of CI1. These metrics fall between 0 and 1, with higher values showing more involvement in credit intermediation while "0" indicating no involvement in credit intermediation.
Maturity transformation (MT) $MT1 = \frac{\left(\text{long-term assets} - \text{equity} \right)}{\text{total financial assets}}$ $MT2 = \frac{\text{short-term liabilities}}{\text{short-term assets}}$	**MT1** is the portion of long-term assets (>12 month maturity) funded by short-term liabilities (≤ 30 days) (ie not funded by equity or long-term liabilities), scaled by the entity type's total financial assets. It falls between −1 and +1, with 0 indicating no maturity transformation, and negative values implying negative maturity transformation. **MT2** is the ratio of short-term liabilities (plus redeemable equity in the case of EF1 entity types) to short-term assets. A value of 1 indicates that short-term liabilities (plus redeemable equity for EF1) are fully covered with short-term assets. Above 1, increases in the ratio indicate that there could be short-term funding dependence. Ratios from 0 to 1 indicate negative maturity transformation.
Liquidity transformation (LT) $LT1 = \frac{\left(\text{total financial assets} - \text{liquid assets (narrow)} + \right)}{\text{total financial assets}}$ $LT2 = \frac{\left(\text{total financial assets} - \text{liquid assets (broad)} + \right)}{\text{total financial assets}}$	**LT** measures the amount of less liquid assets (total financial assets minus liquid assets) funded by short-term liabilities (and/or shares redeemable for cash or underlying assets in the case of CIVs), approximated by short-term liabilities minus liquid assets (under a narrow definition for **LT1** and a broad definition for **LT2**).[89] Total financial assets are also added to the numerator to obtain interpretable results, with a value of "1" indicating no liquidity transformation (ie all near-term demands on liquidity are supported by liquid assets) and "2" indicating that assets are less liquid and are funded by short-term liabilities, including redeemable equity.
Leverage (L) $L = \frac{\text{total financial assets}}{\text{equity}}$	**L** is the ratio of total financial assets to equity (or AUM to NAV in the case of CIVs). The results can be interpreted as a financial leverage ratio or equity multiplier; however, these are not risk-based measures. Although this measure enables comparisons across entity types, it does not take into account non-bank financial entities' leveraging or de-leveraging through the use of derivatives and other off-balance sheet transactions (ie synthetic leverage).

[1] For EF1 entity types, the collected balance sheet data and calculated risk metrics were expanded to also include assets under management (AUM) instead of total financial assets, Gross Notional Exposure and Net Asset Value (to calculate leverage ratios), and non-/redeemable equity (as a form of long-/short-term liability). Ratios related to imperfect credit risk transfer were also considered in past monitoring exercises. However, collected data were not sufficient to allow any meaningful conclusions. In particular, off-balance sheet data items such as off-balance sheet credit exposures were often not available across jurisdictions.

[89] Liquid assets are difficult to measure as the liquidity of an asset at any given time is contingent on a number of external factors. For the purposes of the FSB's monitoring exercise, liquid assets are considered to be all assets that can be easily and immediately converted into cash at little or no loss of value during a time of stress (see also characteristics and definition of High Quality Liquid Assets (HQLAs) in Part 1, Section II.A in BCBS (2013). Two definitions of liquid assets are used in this exercise: in the narrow definition, liquid assets only include cash and cash equivalents; in the broad definition, liquid assets include HQLAs, which can include cash and cash equivalents, but also certain debt and equity instruments that meet certain liquidity characteristics (subject to concentration limits and haircuts).

4.4 Economic Function 1

EF1 includes collective investment vehicles (CIVs) with features that make them susceptible to runs. In many circumstances, CIVs can act as shock absorbers in the financial system as losses from an entity's distress or insolvency or from adverse financial market conditions are shared among a disparate group of investors. In extreme circumstances, however, some CIVs with maturity/liquidity transformation and/or leverage can be susceptible to runs.[90]

4.4.1 Trends in Economic Function 1

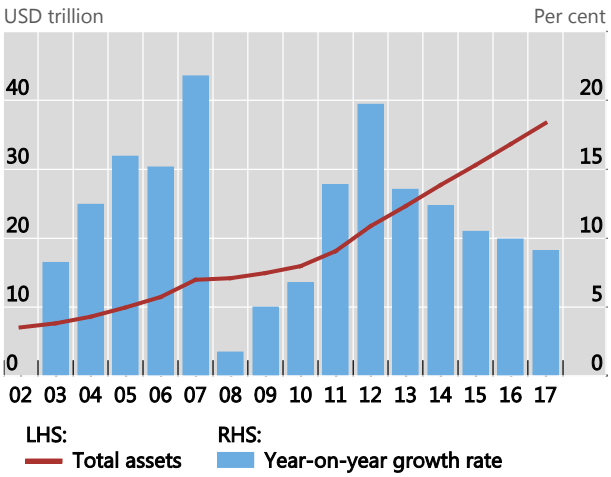
EF1 assets continue to constitute the largest share of the narrow measure (71.2%) with $36.7 trillion at end-2017. EF1 assets grew by 9.1% in 2017, slightly slower than in previous years (Exhibit 4-11), though somewhat faster than the overall narrow measure of NBFI (8.5%). EF1 growth is mainly attributable to the four jurisdictions where most EF1 entities reside – US (with 26.3% of total EF1 assets), China (16.5%), the Cayman Islands (14.3%), and Luxembourg (8.9%). EMEs have shown larger growth in recent years, causing advanced economies' share of total EF1 assets to decrease steadily over time. Most notably, as China's EF1 assets have grown rapidly to $6.1 trillion, the US' share of total EF1 assets has declined, although it remains the jurisdiction with the largest share of total EF1 assets.

Economic Function 1 trends and composition

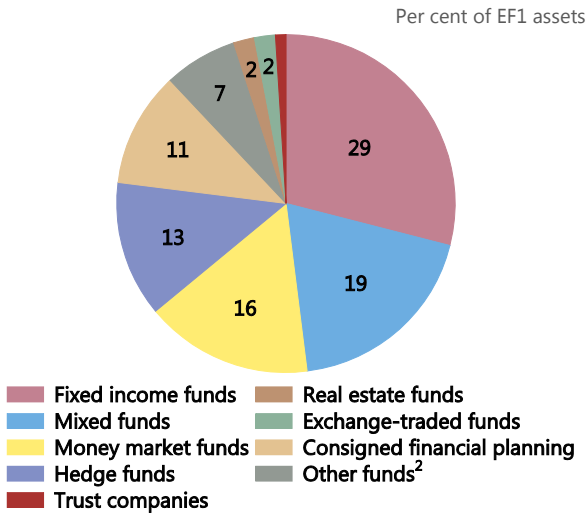
Exhibit 4-11

29-Group

Financial assets level and growth[1]



Breakdown by entity type



[1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). [2] Other funds include equity funds, currency funds, asset allocation funds, closed-ended funds, funds of funds and other investment funds (including jurisdiction-specific fund types).

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

4.4.2 Financial stability risk metrics for EF1

For the 2018 monitoring exercise, more jurisdictions submitted data for risk metrics for most EF1 entity types compared to previous exercises. In general, the liquidity

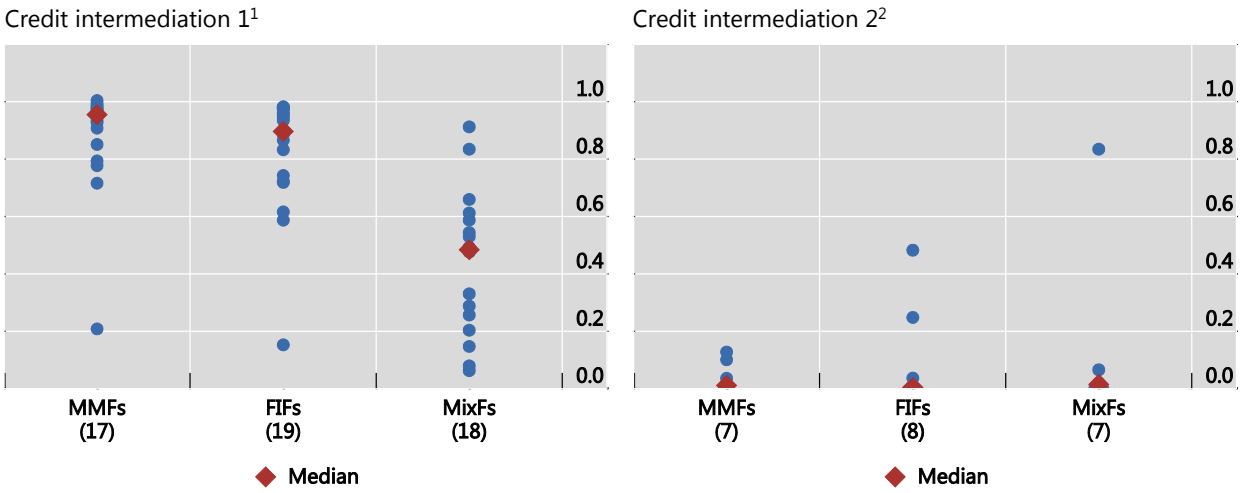
[90] Investment funds focusing on illiquid asset classes might also be susceptible to runs. The focus on CIVs involved in credit intermediation results from this Report's focus on the narrow measure of NBFI.

transformation metrics are high (close to the upper bound of 2) for major EF1 entity types, in particular for fixed income funds, indicating that they have short-term liabilities and short-term redeemable equity in excess of liquid assets. Entities in many jurisdictions (particularly EMEs) had much lower levels of liquidity transformation when taking into account a broader class of liquid assets.[91] This may imply that liquidity risk management would be more challenging for these funds during times of market stress especially if their liquidity buffer is composed mostly of assets other than cash or cash equivalent assets.

The risk metrics also indicated that some jurisdictions' fixed income funds have a combination of high liquidity and maturity transformation. If the portfolios have a higher sensitivity to changes in interest rates, an abrupt rise in rates would impose greater mark-to-market losses and diminish fund returns, which in some circumstances might result in large investor outflows and greater potential for forced asset sales.

(i) Credit intermediation

Credit intermediation — Exhibit 4-12



At end-2017. Each blue dot represents a jurisdiction's overall metric, with total sample size denoted in parentheses below the risk metric label on the x-axis. Each jurisdiction's data submission reflects data from many individual entities within that jurisdiction. [1] Credit assets / AUM. [2] Loans / AUM.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Exhibit 4-12 sets out the credit intermediation metrics for the largest three EF1 entity types. Credit intermediation (CI1) as measured by the ratio of credit assets to assets under management (AUM) was higher for MMFs and fixed income funds than for mixed funds (with median values of 0.96, 0.87 and 0.52 respectively). This reflects their different business models where mixed funds hold a wider range of assets, including higher levels of non-credit assets such as equity. On the other hand, credit intermediation (CI2) as measured by the ratio of loans to AUM, was much lower for all three entity types (all at close to zero), indicating very limited direct lending done by most EF1 entities. This is perhaps not surprising, as funds are generally not direct financial intermediaries such as

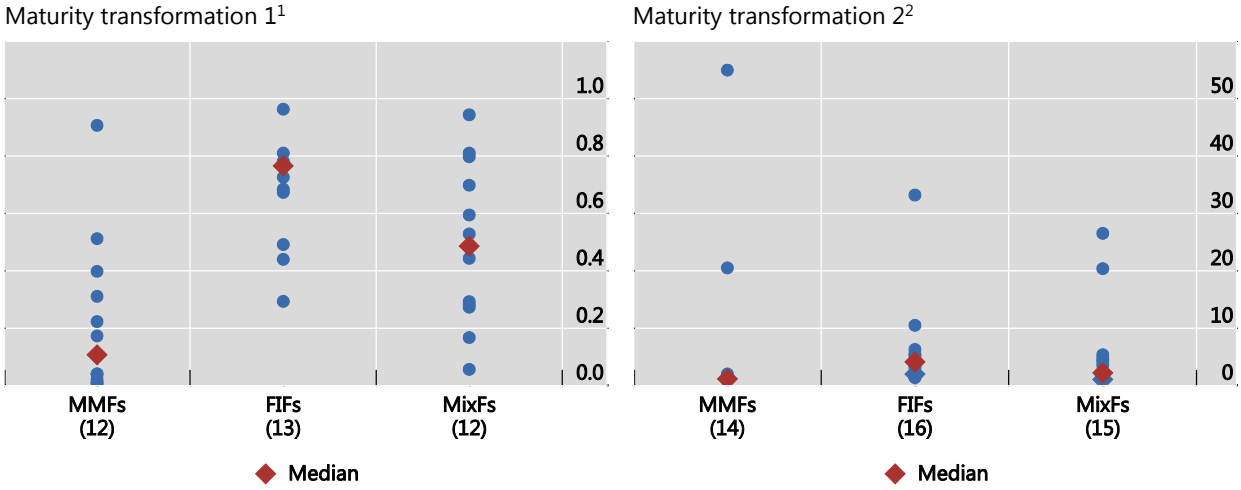
[91] In some cases, differences in the risk metrics across jurisdictions might also be caused by differences in the classification of asset classes (eg as liquid or less liquid assets) across jurisdictions. The FSB will continue to work on further improvements in risk metrics and their analysis.

banks and finance companies.[92] However, in a number of jurisdictions, CI2 metrics were relatively high for fixed income funds and mixed funds, possibly indicating their involvement in direct lending (long- or short-term) or investing in syndicated loans. Both median CI1 and CI2 metrics in 2017 were similar to 2016.

The risk metrics for the relevant entity types differed across jurisdictions, particularly for mixed funds. This is likely due to a wide range of business models adopted by funds of this type across jurisdictions. On the other hand, differences were smaller for MMFs, which indicates that their business models are relatively similar across jurisdictions.

(ii) Maturity transformation

Maturity transformation — Exhibit 4-13



At end-2017. Each blue dot represents a jurisdiction's overall metric, with total sample size denoted in parentheses below the risk metric label on the x-axis. Each jurisdiction's data submission reflects data from many individual entities within that jurisdiction. [1] (Long-term assets - long-term liabilities - equity)/AUM. [2] (Short-term liabilities + redeemable equity)/short-term assets.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Most EF1 entity types were involved in some degree of maturity transformation as can be seen by the positive MT1 values (the portion of long-term assets funded by short-term liabilities plus redeemable equity and scaled by total financial assets) across all fund types (Exhibit 4-13). As expected, based on their business models, the median MT1 value for MMFs (0.04) is much lower than for other funds (0.77 for fixed income funds and 0.49 for mixed funds) with considerable variance across jurisdictions.[93]

Another measure of maturity transformation, MT2 (the ratio of short-term liabilities plus redeemable equity to short-term assets) which may highlight potential funding mismatches, showed a much higher median and variance compared to the MT1 measure across the major EF1 entity types (with median MT2 values of 1.05 for MMFs, 3.96 for fixed income funds and 1.80 for mixed funds). This indicates that some of these funds are funding a portion of their long-term assets with short-term liabilities and may be vulnerable

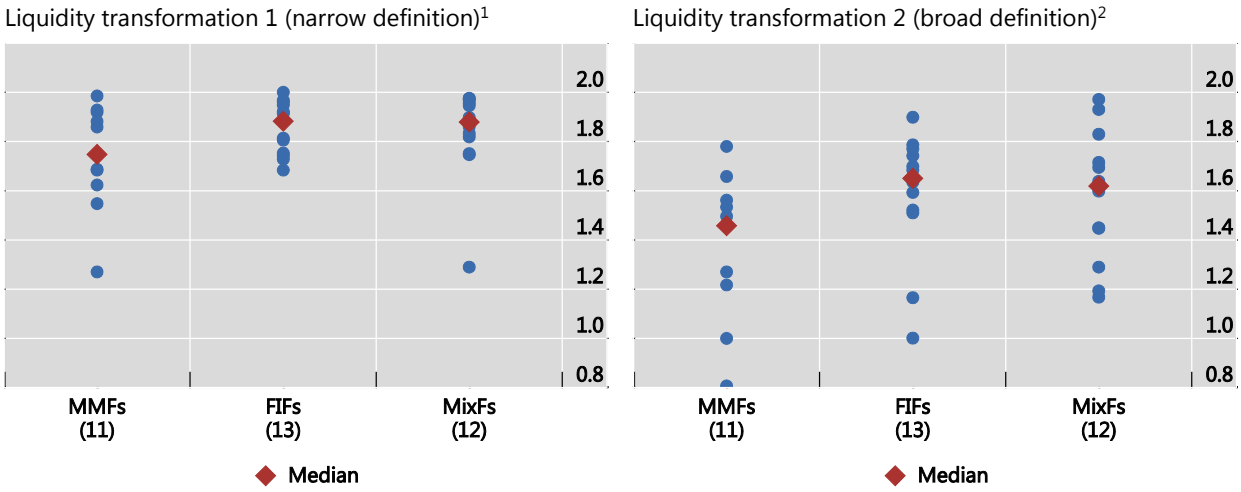
[92] Some funds invest in shares of loan funds or securities of CLOs, and thus exposed to risks of loans.

[93] Such variance may be caused by differences in the classification of asset classes (eg as short- or long-term assets) across jurisdictions. The FSB will continue to work on further improvements in risk metrics and their analysis.

to periods of diminished market liquidity.[94] While MT1 metrics were largely unchanged compared to 2016, MT2 measures decreased slightly for fixed income funds and mixed funds (by 0.08 and 0.32 percentage points, respectively), driven by a few jurisdictions.

(iii) Liquidity transformation

Liquidity transformation — Exhibit 4-14



At end-2017. Each blue dot represents a jurisdiction's overall metric, with total sample size denoted in parentheses below the risk metric label on the x-axis. Each jurisdiction's data submission reflects data from many individual entities within that jurisdiction. [1] (AUM - liquid assets [narrow] + short-term liabilities [≤ 30 days] + redeemable equity [≤ 30 days]) / AUM. [2] (AUM - liquid assets [broad] + short-term liabilities [≤ 30 days] + redeemable equity [≤ 30 days]) / AUM.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

The three major EF1 entity types continued to have high liquidity transformation metrics. The median LT1 value (less-liquid assets funded by short-term liabilities, using a narrower definition of liquid assets[95]) was near the upper limit of two for MMFs (1.75), fixed income funds (1.88) and mixed funds (1.88) in 2017, indicating that short-term liabilities and redeemable equity were in excess of liquid assets (Exhibit 4-14).[96]

Median LT2 values (less-liquid assets funded by short-term liabilities, using a broad definition of liquid assets) were higher than one, suggesting some degree of liquidity transformation for MMFs (1.46), fixed income funds (1.65) and mixed funds (1.62). Neither LT1 nor LT2 values changed much from 2016.

In general, the relatively high LT1 and LT2 measures for EF1 entities are due to the fact that most of the funds classified into EF1 by jurisdictions have an open-ended redemption structure. However, some jurisdictions classified closed-ended funds into EF1 as well.[97]

---

94 MT1 and MT2 are not comparable. However, in terms of values, MT2 seems to take larger values than MT1, possibly because for most funds, holdings of short-term assets are small compared to a fund's redeemable equity.

95 For further details on the definition of liquid assets, see Footnote 88. As highlighted earlier, part of the variation in the risk metrics may also be caused by differences in data submission across participating jurisdictions.

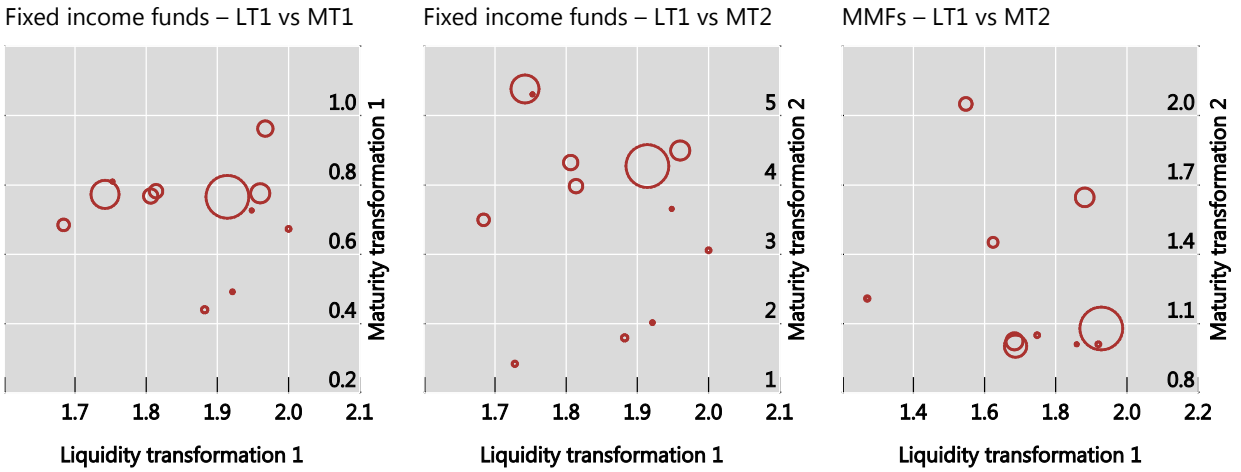
96 This ratio will be biased upwards for jurisdictions that reported total NAV in the total assets field, instead of total AUM without netting of any liabilities.

97 While some jurisdictions classified closed-ended funds into EF1 due to insufficient information on redemption structures of certain entity types, other jurisdictions also classified them into EF1 because the funds are involved in

LT2 naturally tends to be lower than LT1 as the types of "liquid assets" for LT2 to cover short-term liabilities and redeemable equity include a wider set of high-quality liquid assets (HQLA), in addition to cash and cash equivalents. The degree of the difference between LT1 and LT2 as measured by the ratio between the two metrics varies across jurisdictions and EF1 entity types. However, EMEs tend to have higher LT1 to LT2 ratios than advanced economies across the three EF1 entity types.[98] Although more detailed analysis is needed especially on what jurisdictions have included in HQLA in their submissions, this indicates that funds in certain jurisdictions (particularly in EMEs) are more reliant on a broader category of assets other than cash for future potential liquidity needs. It may also imply that these funds may have more challenges in managing liquidity risk effectively during times of market stress compared to funds whose liquid assets are mostly cash or cash equivalent assets. Such potential challenges may be greater for funds with a very high LT1 to LT2 ratio (ie liquid assets are mostly non-cash).

Among the three largest EF1 entity types, fixed income funds tend to have higher liquidity transformation metrics (LT1 and LT2). When looking at these metrics in combination with maturity transformation metrics (MT1 and MT2) above, certain jurisdictions that displayed higher levels of maturity transformation tended to also display higher levels of liquidity transformation (Exhibit 4-15). However, the relationship between the two does not seem to be particularly strong across jurisdictions, although further assessment is needed. This may, for example, imply that funds in some jurisdictions invest in long-term assets that tend to have liquid markets such as high quality sovereign bonds.

Risk metrics[1] Exhibit 4-15



[1] At end-2017. Size of bubble denotes the sector's absolute size. MT1: (long-term assets - long-term liabilities - nonredeemable equity) / AUM. MT2: (short-term liabilities [≤ 12 months] + redeemable equity [≤ 12 months]) / short-term assets [≤ 12 months]. LT1: (AUM - liquid assets [narrow] + short-term liabilities [≤ 30 days] + redeemable equity [≤ 30 days]) / AUM.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

credit intermediation and the jurisdictions' regulations allow closed-ended funds to operate more like open-ended funds.

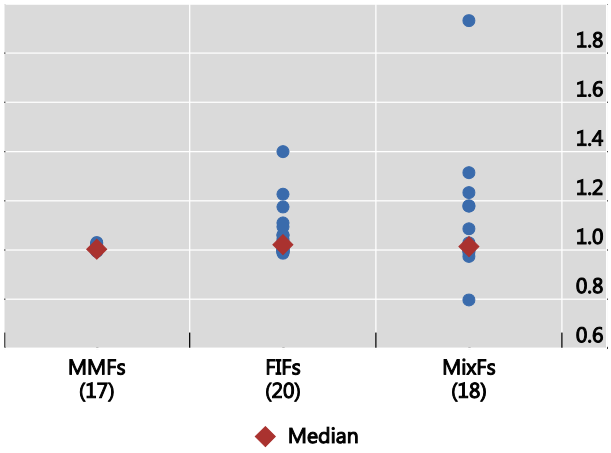
98 The EME ratio of LT1 to LT2 tends to be higher for MMFs, followed by fixed income funds and mixed funds, whereas the ratio for advanced economies tends to be broadly the same for all three entity types and lower than EMEs.

(iv) Leverage

Reported balance sheet leverage, as measured by AUM divided by NAV (or L1), continued to be low across the largest EF1 entity types (Exhibit 4-16): median L1 values were close to one (1.00, 1.03, 1.01, for MMFs, fixed income funds, mixed funds, respectively), and did not change much compared to 2016. For these types of funds, many jurisdictions have regulatory limits on balance-sheet leverage which leads to relatively low leverage. However, there was some cross-jurisdictional variation, particularly for mixed funds.

As data on synthetic leverage (obtainment of leverage through the use of off-balance sheet transactions such as derivatives) were only provided by some jurisdictions, examining the potential impact of synthetic leverage continues to be a challenge. The L1 measures therefore only provide a partial view of the leverage obtained by the relevant EF1 entities.[99] In this regard, IOSCO published a consultative document on fund leverage in November 2018[100] as part of its operationalisation of the FSB's January 2017 *Policy Recommendations to Address Structural Vulnerabilities from Asset Management Activities* (see Recommendations 10-12).[101] IOSCO's consultative document sought public input on a proposed framework that aims at achieving a meaningful and consistent assessment of global fund leverage. It could also help refine the analysis of fund leverage in future monitoring exercises.

Leverage[1] Exhibit 4-16



At end-2017. Each blue dot represents a jurisdiction's overall metric, with total sample size denoted in parentheses below the risk metric label on the x-axis. Each jurisdiction's data submission reflects data from many individual entities within that jurisdiction. [1] AUM / NAV.

Sources: National sectoral balance sheet and other data; FSB calculations.

(v) Concentrations

In the 2018 monitoring exercise, risk metrics were collected for two years (data as of end-2016 and end-2017) for the first time, as well as for the largest five EF1 entities to help assess market concentrations (as of end-2017). Looking at concentrations for the three largest EF1 entity types based on jurisdictions' 2018 submissions, there are differences

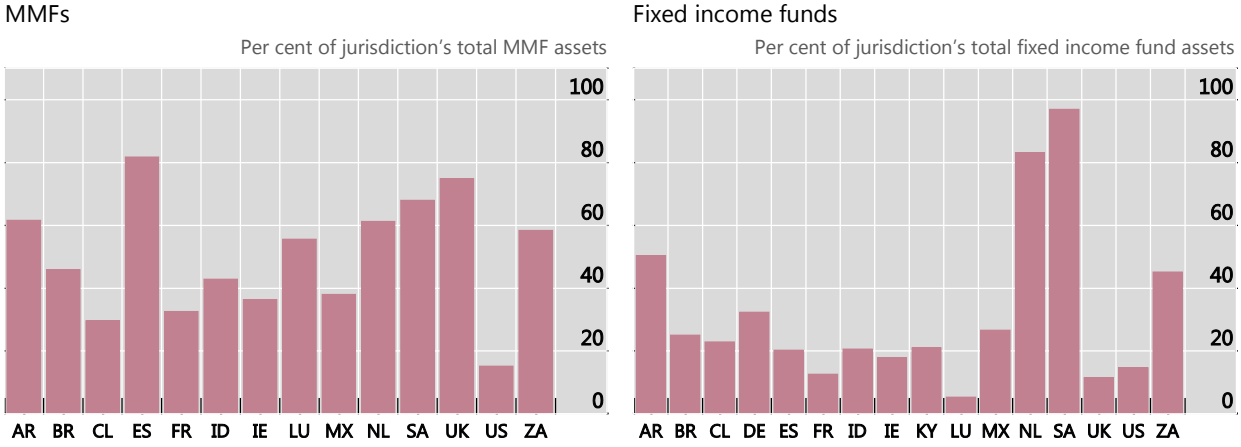
[99] Eg see Box 2-3 of FSB (2018a) or IOSCO (2017) for synthetic leverage estimates for hedge funds in some jurisdictions.

[100] See IOSCO (2018).

[101] For details, see FSB (2017a).

across jurisdictions. In general, concentration levels are higher for MMFs compared to fixed income funds or mixed funds (Exhibit 4-17), with the largest five MMFs accounting for over 50% of total MMF assets in seven out of 13 jurisdictions that reported this data. On the other hand, fixed income funds were less concentrated in most jurisdictions, albeit highly concentrated in two jurisdictions (in which the largest five funds accounted for more than 80% of the total sector assets).

Five largest entities' share of total assets, by fund type and jurisdiction — Exhibit 4-17



At end-2017.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

4.5 Economic Function 2

EF2 entities engage in loan provision that is dependent on short-term funding. Finance companies, the dominant EF2 entity type, often specialise in areas such as consumer finance, auto finance, retail mortgage provision, commercial property finance, and equipment finance. Entities engaged in these activities tend to either compete with banks or offer services in niche markets where banks are not active players, and often concentrate their lending in specific sectors due to expertise and other reasons. This may create significant risks if the sectors they focus on are cyclical in nature. Such risks may be exacerbated if these entities are heavily dependent on short-term funding or wholesale funding, or are dependent on parent companies for funding and the parent companies are in the same cyclical sectors.[102]

4.5.1 Trends in Economic Function 2

EF2 grew by 5.8% in 2017 to $3.5 trillion or 6.7% of the narrow measure (Exhibit 4-18, LHS). The growth in EF2 assets was broad-based, reflecting growth in 20 of the 26 jurisdictions that reported having EF2 entities.[103] Growth varied widely, with EF2 assets in five jurisdictions increasing by over 20% (Argentina, China, India, Spain and Turkey), in part due to a low base or inflation. Although in some cases it was from a low base, EF2's growth in EMEs was nonetheless significant: in dollar terms about 4.5 times that of advanced economies, largely driven by China and India. EF2 remains mostly composed of finance

[102] As stated in Section 4.1, all entities classified into EFs exclude entities prudentially consolidated into banking groups.

[103] Indonesia, Ireland and Luxembourg did not classify any entity types into EF2 as no such entity types were assessed as meeting EF2 classification criteria based on submitted data/information.

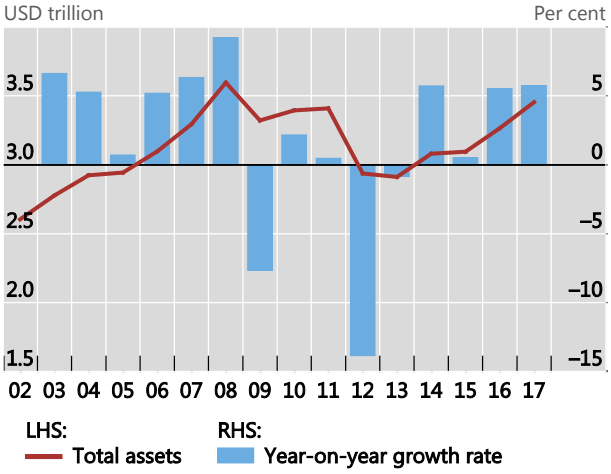
companies (with 79% of total EF2 assets). EF2 entities are relatively concentrated in the US (with 32.1% of the total EF2 assets), Japan (15.3%) and India (11.6%).

Economic Function 2 trends and composition

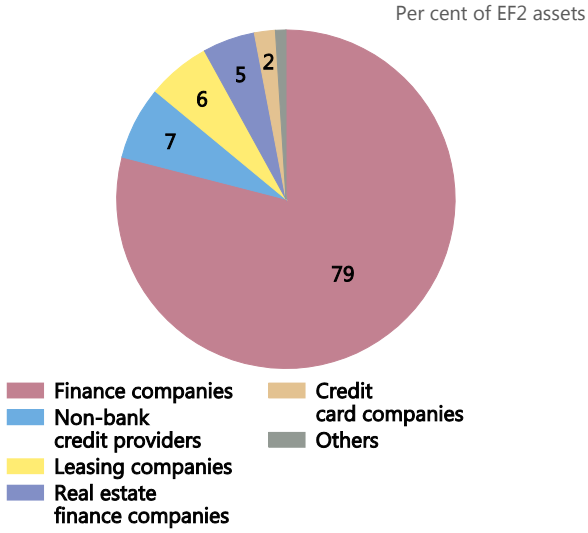
Exhibit 4-18

29-Group

Financial assets level and growth[1]



Breakdown by entity type[2]



[1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). Net of prudential consolidation into banking groups. Changes relative to the 2017 Report are due to data revisions. [2] At end-2017. Others = credit unions and venture capital firms.

Sources: Jurisdictions' 2018 submissions (national sector balance sheet and other data); FSB calculations.

4.5.2 Financial stability risk metrics for EF2

Since finance companies account for most EF2 assets, the analysis here of risk metrics focuses primarily on finance companies and on the risk metrics most relevant for these entities (Exhibit 4-19).[104] Overall, as discussed below, EF2 entities engage primarily in credit intermediation, with a somewhat elevated degree of leverage, particularly when accounting for off-balance sheet exposures (as illustrated by L2 metrics). Relatively high leverage and maturity transformation were observed in finance companies in some jurisdictions. Risk metrics changed little between 2016 and 2017.

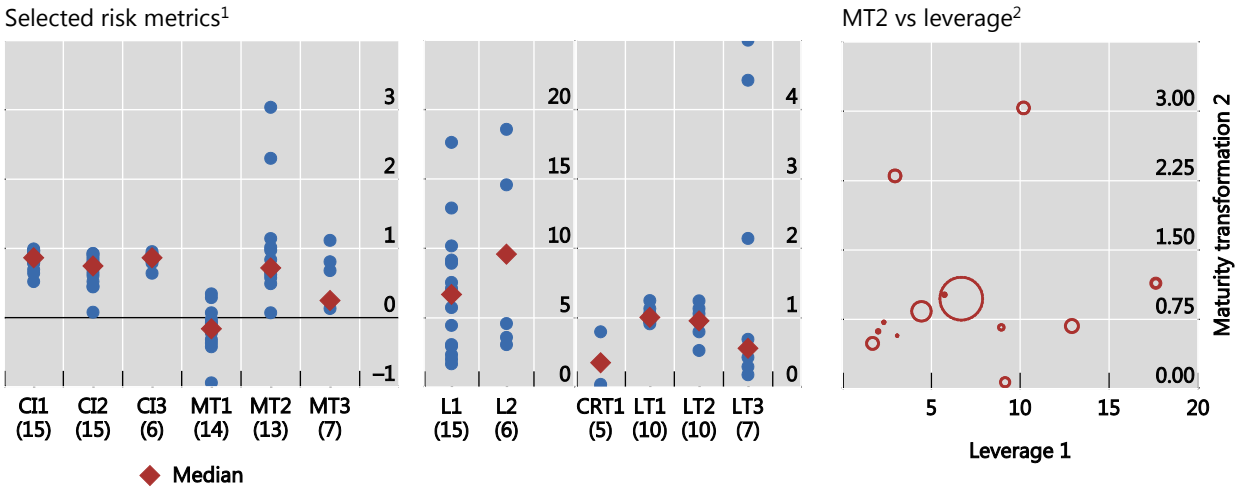
Looking more closely at the risk metrics:

- The median value for CI1 (ratio of credit assets to total financial assets) was 0.86 in 2016 and 0.83 in 2017, while the median value for CI2 (ratio of loan assets to total financial assets) was 0.77 in 2016 and 0.75 in 2017. Although this suggests a slight reduction in the extent of credit intermediation performed by finance companies in 2017, they nonetheless continue to engage in a significant degree of credit intermediation, as the maximum value of this ratio is 1.
- The median value for MT1 (the ratio of long-term assets funded by short-term liabilities) was -0.11 in 2016 and -0.16 in 2017, indicating that only a negligible portion of long-term assets have been funded through short-term liabilities (or the absolute amount of short-term liabilities is very small compared to long-term

[104] Other entity types classified into EF2 may also pose risks to financial stability. Due to data limitations, some jurisdictions submitted data that includes entities prudentially consolidated into banking groups.

liabilities). The median maturity transformation metric MT2 (the ratio of short-term liabilities to short-term assets) was 0.75 in 2016 and 0.70 in 2017, indicating a decline in the degree of maturity transformation over 2017. This was largely driven by two jurisdictions that saw relatively large declines in MT2 (Exhibit 4-20, LHS). MT2 varied significantly across jurisdictions, spanning from 0.07 to 3.04: a wider range than other maturity transformation metrics.

Risk metrics for finance companies — Exhibit 4-19



At end-2017. Each blue dot represents a jurisdiction's overall metric, with total sample size denoted in parentheses below the risk metric label on the x-axis. Each jurisdiction's data submission reflects data from many individual entities within that jurisdiction. [1] CI1 = credit assets / total financial assets; CI2 = loans / total financial assets; CI3 = (credit assets + credit off balance sheet exposures) / (AUM + total off balance sheet exposures); MT1 = (long-term assets – long-term liabilities - equity) / total financial assets; MT2 = short-term liabilities [≤ 12 months] / short-term assets [≤ 12 months]; MT3 = short-term liabilities [≤ 30 days] / short-term assets [≤ 3 months]; LT1 = (total financial assets - liquid assets [narrow] + short-term liabilities [≤ 30 days]) / total financial assets; LT2 = (total financial assets - liquid assets [broad] + short-term liabilities [≤ 30 days]) / total financial assets; LT3= short-term liabilities [≤ 30 days] / liquid assets [broad]; CRT = credit off balance sheet exposures / (total financial assets + total off balance sheet exposures); L1 (Leverage 1) = total financial assets / equity; L2 = (total financial assets + total off balance sheet exposures) / equity. Some risk metrics included data from entities prudentially consolidated into banking groups, as some jurisdictions' granular data do not distinguish between consolidated and non-consolidated entities. [2] Size of bubble denotes the sector's absolute size. Only jurisdictions which provided data for both the L1 metric and the MT2 metric appear in this chart.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

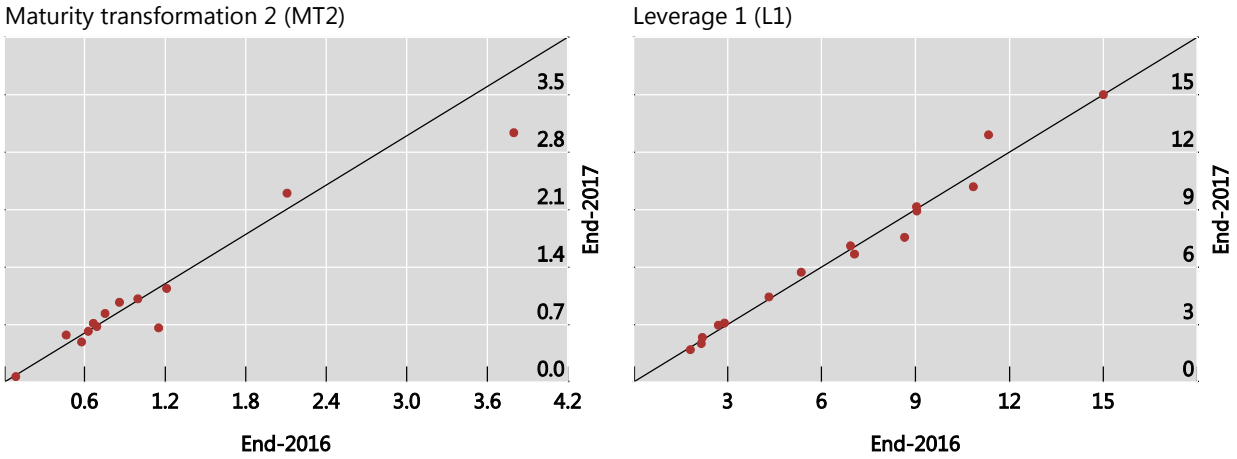
- The median liquidity transformation metrics LT1 (less-liquid assets funded by short-term liabilities, using a narrow definition of liquid assets) and LT2 (less-liquid assets funded by short-term liabilities, using a broad definition of liquid assets) were slightly above 1 across the ten jurisdictions that provided these metrics, indicating that short-term liabilities are roughly equivalent to liquid assets for these jurisdictions (ie very small liquidity transformation). While median LT3 (the ratio of less than 30-days liabilities to liquid assets, using a broad definition of liquid assets) was low (0.69), three jurisdictions reported values in excess of 2, which may indicate that finance companies in these jurisdictions may be vulnerable to liquidity shocks during times of market stress.
- The median L1 leverage ratio (ratio of total financial assets to equity) for finance companies was 6.9 in both 2016 and 2017, indicating a moderate to low amount of leverage. The median L2 ratio (ratio of total financial assets and total off-balance sheet exposures to equity) of 9.5 in 2016 and 9.6 in 2017 indicates that finance companies are likely taking on leverage through off-balance sheet exposures (or synthetic leverage). Across jurisdictions there was significant variance in the degree

of leverage, with L1 ranging from 1.7 to 17.6, and L2 ranging from 3.1 to 61.9. Jurisdictions that displayed higher levels of maturity transformation tended to be also associated with higher levels of leverage (Exhibit 4-19, RHS).

Finance Companies

End-2016 versus end-2017

Exhibit 4-20



MT2 = short-term liabilities [≤ 12 months] / short-term assets [≤ 12 months]; L1 = total financial assets / equity.

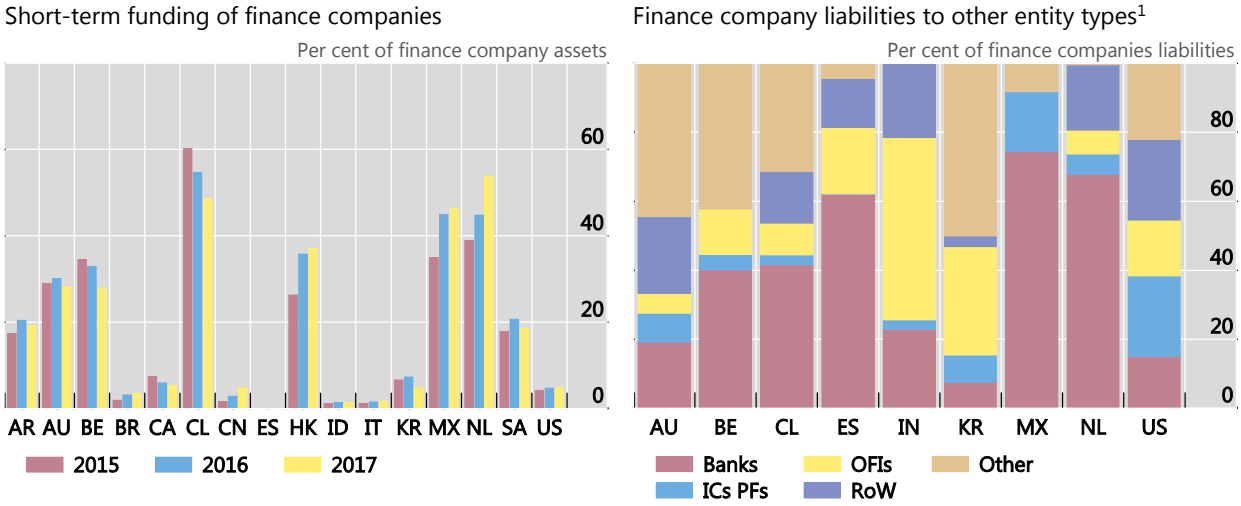
Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

- Collecting off-balance sheet data continues to be a challenge. Where data is available, the median credit risk transfer (ratio of credit off-balance sheet exposures[105] to the sum of total financial assets and total off-balance sheet exposures) was somewhat moderate at about 20% in both 2016 and 2017. Nevertheless, credit risk transfer was almost 80% in one jurisdiction, implying an elevated degree of credit risk transfer.
- Short-term wholesale funding of finance companies was over 25% of total finance company assets in six of the 15 jurisdictions that provided such data and above 40% in three jurisdictions (Exhibit 4-21, LHS). Between 2015 and 2017, finance companies in ten of these jurisdictions saw their use of short-term funding increase relative to total assets. Further improvement to data collection and more granular analysis may be needed going forward.
- The structure of finance company liabilities differed significantly across jurisdictions (Exhibit 4-21, RHS). Banks were the largest single source of finance company liabilities in Mexico (74% of total finance company liabilities), the Netherlands (68%), Spain (62%) and Chile (42%),[106] while OFIs were the largest source in India (53%). This suggests that the interconnectedness between finance companies and the rest of the financial system may be quite varied across jurisdictions.

[105] Credit off-balance sheet exposures are off-balance sheet exposures related to credit such as financial guarantees.

[106] For some jurisdictions, these high levels of funding from banks may be due to a large share of finance companies being prudentially consolidated into banking groups (these entities are excluded from the narrow measure).

Finance company short-term funding and liability structure Exhibit 4-21



Data covers all finance companies, including some entities not classified into EF2. Note: LHS panel only includes jurisdictions that provided short-term wholesale funding for all three years; the right panel only includes jurisdictions that provided a breakdown of finance company interconnectedness data. "Other" category is the difference between the total liabilities of finance companies in a jurisdiction and the sum of identified liabilities. [1] At end-2017.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

4.6 Economic Function 3

EF3 involves the intermediation of market activities that is dependent on short-term funding, including the secured funding of client assets and securities borrowing and lending. Exhibit 4-22 shows that EF3 is mostly made up of broker-dealers (83% of total EF3 assets). EF3 entities such as broker-dealers fulfil several important functions, including providing short-term credit to their clients in covering their positions, supplying liquidity through market-making activities, facilitating trading activities, providing investment advice to clients, publishing investment research and helping raise capital for corporates.[107] Of the 29 participating jurisdictions, 25 classified entities into EF3. A handful of jurisdictions (China, Japan, Korea, the UK and the US) accounted for 93% of total EF3 assets.

4.6.1 Trends in Economic Function 3

EF3 assets totalled $4.2 trillion at end-2017, and now comprise 8.2% of the narrow measure. EF3 assets grew 5.2% in 2017, reversing modest declines in 2015-16 (Exhibit 4-22).[108] Given the degree of concentration, four jurisdictions were the primary drivers of

[107] EF3 entities' intermediation activity may also include securities brokerage services (ie buying and selling of securities and derivatives on- and off-exchanges including in a market-making role) as well as prime brokerage services to hedge funds.

[108] Due to data limitations, some jurisdictions submitted data including entities prudentially consolidated into banking groups. The post-crisis decline in EF3 assets seen in the LHS of Exhibit 4-22 was to some extent due to changes in the regulatory status of some large broker-dealers, which converted to bank holding companies or others that were consolidated into banking groups with regulatory/supervisory changes.

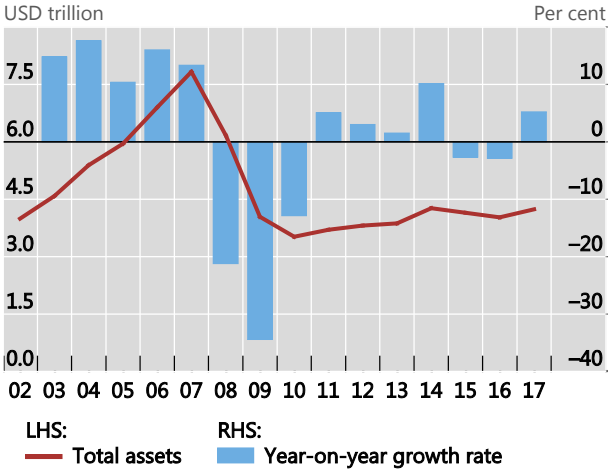
growth in 2017: China (17.9% growth), Japan (3.3%), Korea (14.6%) and the US (4.9%), which together offset a decline in the UK (-12.0%).[109]

Economic Function 3 trends and composition

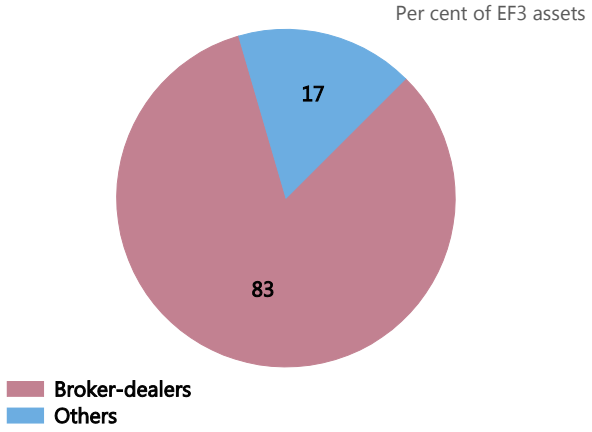
Exhibit 4-22

29-Group

Financial assets level and growth[1]



Breakdown by entity type[2]



[1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). Net of prudential consolidation into banking groups. [2] At end-2017. Others = custodial accounts and pension funds. Broker-dealers = broker-dealers, money market broker-dealers, securities dealers and securities finance companies.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

4.6.2 Financial stability risk metrics for EF3

If EF3 entities take on significant degrees of leverage and maturity/liquidity transformation, they could: (i) exacerbate or cause runs if general market and asset price conditions deteriorate; and (ii) precipitate viability concerns, if funding providers become concerned over the price deterioration of collateral supporting short-term borrowing.[110] Depending on these entities' funding models, these activities may involve liquidity risks, including intra-day liquidity risk. These entities may also be vulnerable to roll-over risk or runs by lenders if they are leveraged, particularly if their funding is primarily dependent on wholesale funding (eg repos). Some financial stability risk metrics for broker-dealers, the largest component of EF3, are discussed below (see also Exhibit 4-23):

- The median CI1 (ratio of credit assets to total financial assets) for broker-dealers was 0.65 in both 2016 and 2017, while the median CI2 (ratio of loans to total financial assets)[111] was 0.17 in 2016 and 0.15 in 2017.[112] Some jurisdictions had relatively high metrics with four jurisdictions having CI1 metrics above 0.80, and two jurisdictions having CI2 metrics above 0.40. These metrics indicate that most broker-dealers' credit intermediation activities are through debt securities and reverse repos, with only a fraction involving actual lending.

[109] The decline in UK EF3 assets may be partly due to currency effects as the UK pound appreciated relative to the US dollar in 2017, which is the functional currency of many UK broker-dealers.

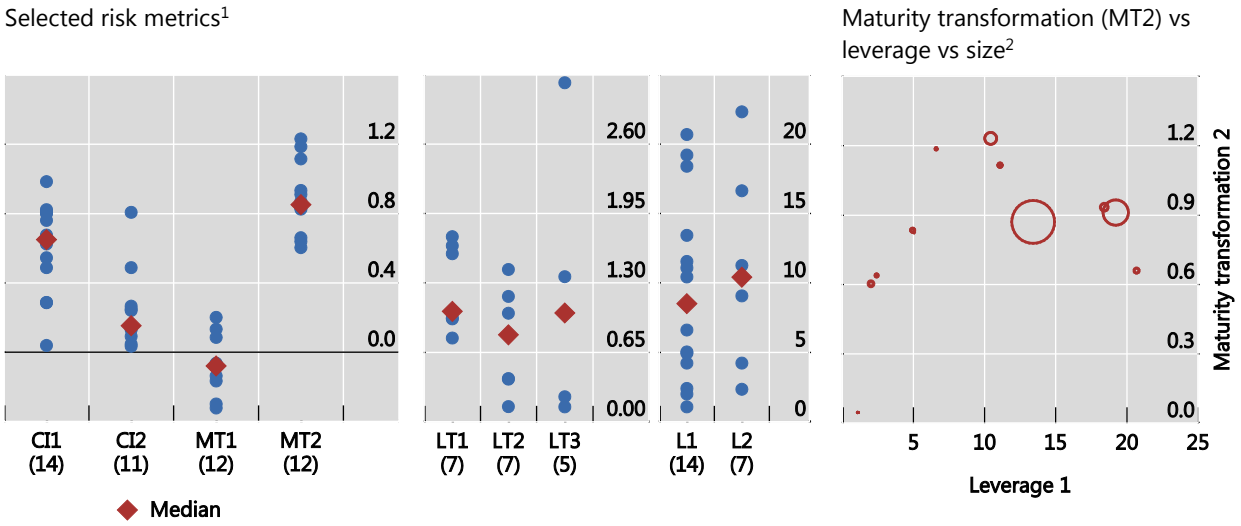
[110] In some jurisdictions (eg the US), the risks of broker-dealers are generally mitigated by the fact that the transactions are secured with liquid securities collateral (ie securities that have a ready market) and the balance sheet of the broker-dealer is comprised almost exclusively of cash and liquid securities.

[111] Excluding reverse repos (or repo assets).

[112] Jurisdictions reporting total assets instead of financial assets may have biased these two risk metrics downwards.

- MT1 (the ratio of long-term assets funded by short-term liabilities) varies above and below zero, with a median value of -0.07 in 2016 and -0.08 in 2017. The negative values, reported by 9 out of 12 jurisdictions indicate that long-term liabilities could be financing not only long-term credit but also non-credit assets (eg equity). The median MT2 (ratio of short-term liabilities to short-term assets) was 0.91 in 2016 and 0.85 in 2017, also indicating negative maturity transformation.

Risk metrics for broker-dealers — Exhibit 4-23



At end-2017. Each blue dot represents a jurisdiction's overall metric, with total sample size denoted in parentheses below the risk metric label on the x-axis. Each jurisdiction's data submission reflects data from many individual entities within that jurisdiction. [1] CI1 = credit assets / total financial assets; CI2 = loans / total financial assets; MT1 = (long-term assets – long-term liabilities - equity) / total financial assets; MT2 = short-term liabilities [≤ 12 months] / short-term assets [≤ 12 months]; LT1 = 1 + (short-term liabilities [≤ 30 days] – liquid assets [narrow]) / total financial assets; LT2 = 1 + (+ short-term liabilities [≤ 30 days] - liquid assets [broad]) / total financial assets; LT3= short-term liabilities [≤ 30 days] / liquid assets [broad]; L1 = total financial assets / equity; L2 = (total financial assets + total off balance sheet exposures) / equity. Some risk metrics included data from entities prudentially consolidated into banking groups, as some jurisdictions' granular data do not distinguish between consolidated and non-consolidated entities. [2] Size of bubble denotes the sector's absolute size. Only jurisdictions which provided data for both the L1 metric and the MT2 metric appear in this chart.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

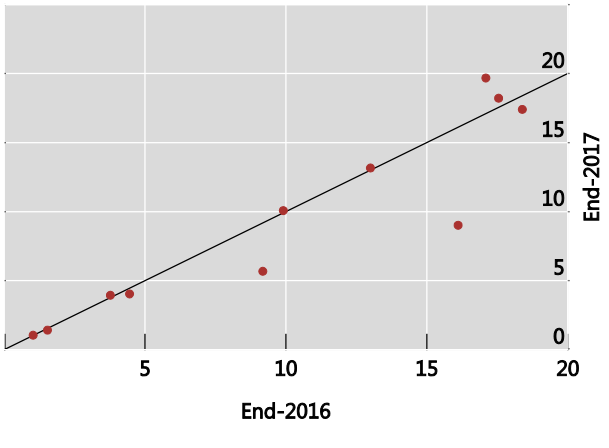
- The median LT1 measure (less-liquid assets funded by short-term liabilities, using a narrow definition of liquid assets) was largely stable (at 1.03 in 2017 compared to 0.99 in 2016), while the median LT2 measure (less-liquid assets funded by short-term liabilities, using a broad definition of liquid assets) increased from 0.63 to 0.81 over the same period. Together these metrics imply that short-term liabilities roughly equaled liquid assets under the narrow definition, and short-term liabilities were far less than liquid assets under the broad definition. Two jurisdictions, however, saw LT1 above 1.5 and LT2 above 1.15, indicating significant liquidity transformation in these jurisdictions.[113]
- The median value of L1 (the ratio of total financial assets to equity capital) was 10.4 in 2016 and 8.5 in 2017, with three jurisdictions reporting L1 above 15. While the median value of L1 declined between 2016 and 2017, seven jurisdictions saw L1 increase over this period. At the same time, median debt-to-equity ratios were 9.9 in 2016 and 9.0 in 2017 (Exhibit 4-24, LHS). Together, these metrics indicate that

[113] [For one of these two jurisdictions where end-2016 data is available, LT1 and LT2 were higher in 2016.]

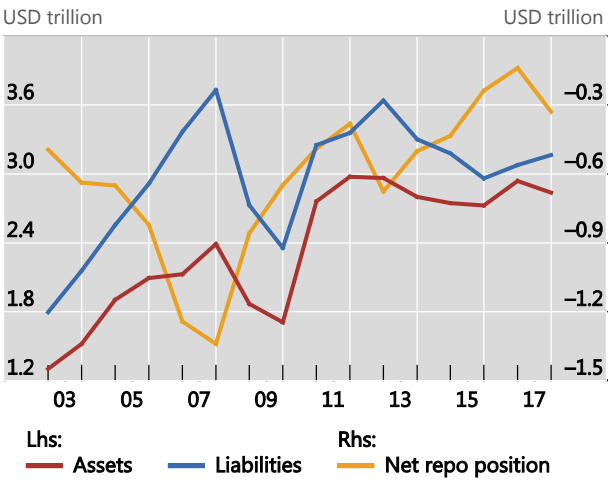
broker-dealers use balance sheet leverage, which declined slightly in 2017. Meanwhile, the median L2 (the ratio of total financial assets and total off-balance sheet exposures to equity)[114] declined significantly, from 14.7 in 2016 to 10.4 in 2017, with two jurisdictions having L2 above 15. Although the median leverage values declined in 2017, these metrics imply that some broker-dealers take on further leverage through off-balance sheet exposures.

Debt-to-equity ratios and repo market activity of broker-dealers — Exhibit 4-24

Debt-to-equity ratios[1]



Broker-dealer repo assets and liabilities[2]



Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). [1] For AR, CA, FR, HK, IN, JP, KR, MX, RU, SG and the US. [2] For AU, BR, CL, ES, FR, ID, JP, KR, MX, SG, UK and the US.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

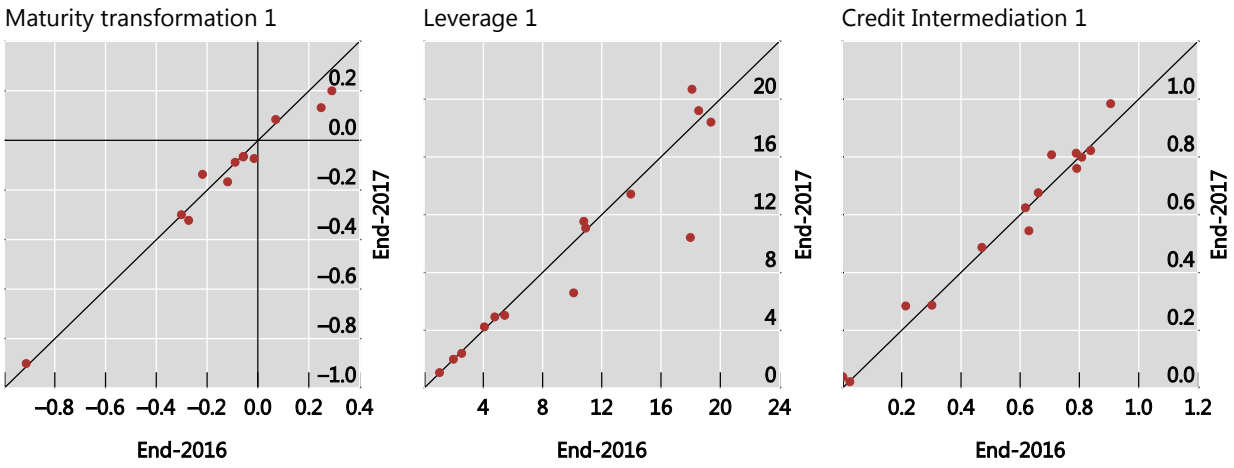
- Risk metrics were broadly similar in 2016 and 2017 (Exhibit 4-25). Broker-dealers in four jurisdictions simultaneously had above-median leverage, credit intermediation and maturity transformation metrics, which were similar to their reported metrics in 2016 or increased slightly in 2017.
- For the first time, jurisdictions provided repo asset and liability data for broker-dealers. Repos were a major funding technique for broker-dealers, with 5 of the 12 reporting jurisdictions having repo liabilities above 40% of broker-dealer assets. Reporting jurisdictions saw repo assets of broker-dealers fall by 3.5% to $2.8 trillion in 2017, and repo liabilities grow 2.8% to $3.2 trillion (Exhibit 4-24, RHS). This resulted in a slight decline in broker-dealer's net repo position (repo assets minus repo liabilities), indicating that broker-dealers became somewhat greater net recipients of funding from repo markets in 2017 (although broker-dealers had obtained steadily less funding from repo markets from 2012-16). The trend in 2017 was driven by the largest jurisdictions. In most jurisdictions, broker-dealers were net recipients of funding. Broker-dealers in some jurisdictions, which had been net providers of funding in recent years, saw their net repo position turned into slightly negative in 2017. These broker-dealers, however, typically maintain a matched-book structure, and thus their net repo position has been around zero.

[114] The sample size for this metric is half of that for L1. This metric may overstate risks associated with leverage as it includes total off-balance sheet positions, without accounting for hedging or netting.

Broker-dealers

Exhibit 4-25

Current year versus previous year



Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

4.7 Economic Function 4

EF4 entities facilitate the creation of credit, for example, when financial guarantors or monoline insurers extend various forms of guarantees to bank and non-bank financial entities, such as off-balance sheet commitments and derivatives. This additional credit protection attracts investors as it makes full repayment more likely, even if the borrower does not meet its obligations. From the borrower's perspective, the lender's creditworthiness is improved by the credit quality of the guarantor, reducing funding costs for a given risk profile. Credit insurance providers and sellers of credit default swaps (CDS) facilitate credit creation by insuring or enhancing credit instruments, thereby enhancing their marketability. The case study in Section 5.5 takes a closer look at the use of CDS by European non-bank financial intermediaries.

The pricing of insurance protection should in principle reflect the creditworthiness of both borrower and guarantor, but asymmetric information or other market failures can result in imperfect credit risk transfer. If credit, liquidity or counterparty risks are not properly priced, or incentives are misaligned, EF4 entities may help create excessive risk-taking or mispricing of risk, potentially contributing to boom-bust cycles.[115] Indeed, credit facilitators played a significant role during the period leading to the financial crisis. For example, by enhancing the credit quality of subprime mortgages or tranches of mortgage-backed securitisation (eg collateralised debt obligations (CDOs)), they facilitated credit and thus contributed to the build-up of excessive leverage in the financial system.

4.7.1 Trends in Economic Function 4

EF4 remains a relatively small part of the narrow measure, with assets totalling just $173.4 billion, or 0.3% of the narrow measure at end-2017 (Exhibit 4-26). Although 19 jurisdictions classified entities into EF4, assets of EF4 entities were concentrated in five euro area jurisdictions and the US, which together represent 76.2% of total EF4 assets. EF4 assets

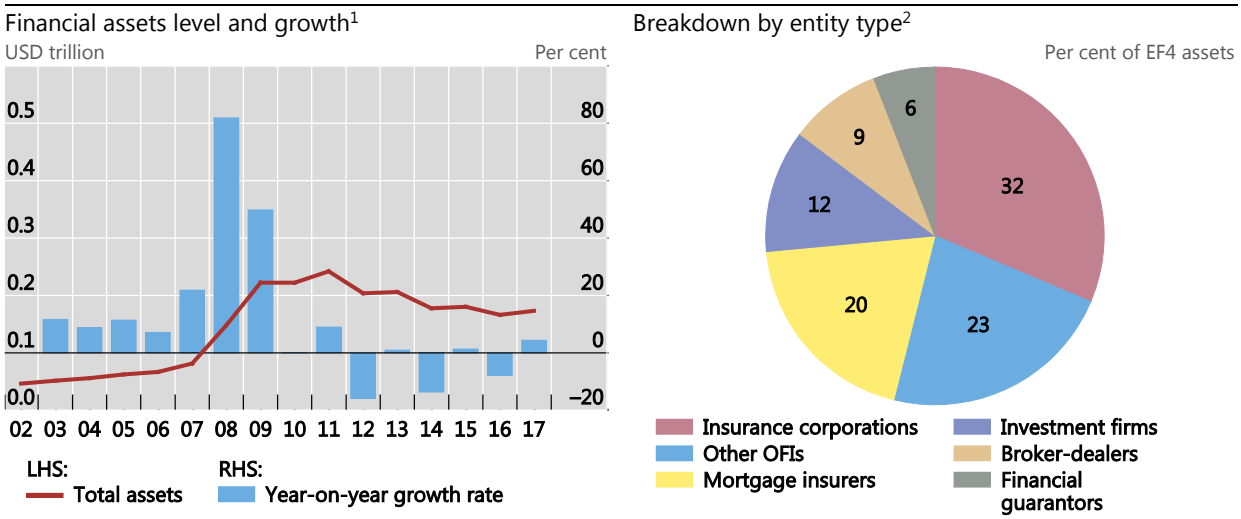
[115] See FSB (2013).

grew by 4.4% in 2017, with most jurisdictions seeing their EF4 assets increase in value over the year (ie only four saw EF4 assets decline).

EF4's impact and importance may be significantly understated due to the difficulty of adequately capturing off-balance sheet exposures. This is largely because credit insurers, which can facilitate substantial credit extension by banks or non-banks, often have modest balance sheets due to the nature of their business. Of the most commonly reported EF4 entity types, nearly three quarters of assets consisted of insurance corporations, mortgage insurers, investment firms (which use CDS) and SFVs. Since some of these entity types were only reported by some jurisdictions, there may be a need to address data gaps or analyse the concentration of these businesses in certain jurisdictions.

Economic Function 4 trends and composition

29-Group Exhibit 4-26



[1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). Net of prudential consolidation into banking groups. [2] At end-2017.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

4.7.2 Financial stability risk metrics for EF4

Due to the small size of EF4 (jurisdictions do not need to report risk metrics if an entity type's aggregate size is below 1% of their jurisdiction's total financial assets), the relatively sparse risk data provided by jurisdictions[116] and the unique nature of EF4, it is currently difficult to infer broad conclusions about the risks posed by EF4 to the financial system.

4.8 Economic Function 5

EF5 involves both securitisation-based credit intermediation and funding of financial entities. Both bank and non-bank financial intermediaries often use securitisation for funding purposes (with or without the transfer of assets and risks from the securitisation entities), as well as for improving their lending portfolios and for capital management purposes. By facilitating the transfer of credit risk off-balance sheet, securitisation reduces funding costs for both bank and non-bank financial entities, and facilitates the availability

[116] Argentina, Canada, Chile, Italy, Mexico, South Africa, UK and US provided enough data to calculate at least one risk metric.

of credit to the real economy. These beneficial effects of securitisation could, however, also contribute to a build-up of excessive maturity/liquidity transformation, leverage, or regulatory arbitrage in the system, which becomes a greater risk in financial systems with relatively less stringent lending standards. The securitisation market is also sensitive to sudden reductions in market liquidity, particularly in the case of complex securitisations or securitisations that lack transparency to investors.

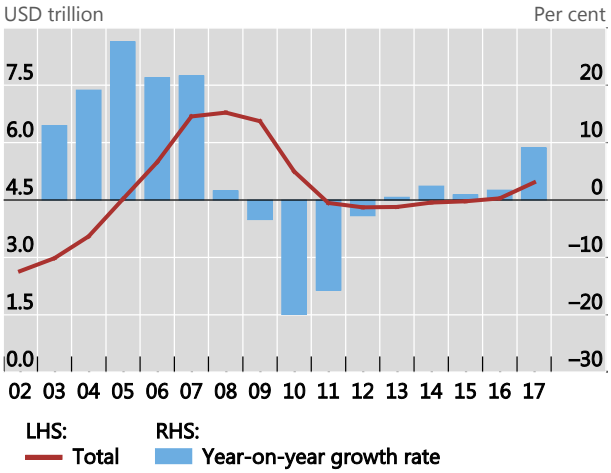
4.8.1 Trends in Economic Function 5

Economic Function 5 trends and composition

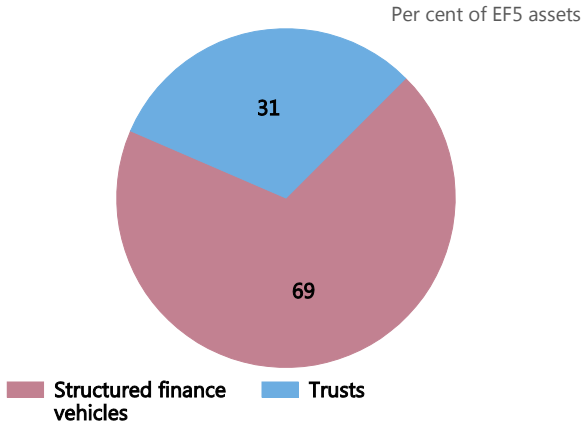
Exhibit 4-27

29-Group

Financial assets level and growth[1]



Breakdown by entity type[2]



[1] Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). Net of prudential consolidation into banking groups. [2] At end-2017. Mortgage REITs and funds are primarily classified in EF1, but jurisdictions may also classify mortgages REITs and funds into EF5 if they also meet the criteria for this economic function, in which case their value will be proportionately allocated between EF1 and EF5 (see Footnote 66). EF5 includes other entity types such as synthetic ETFs that are immaterial.

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

EF5 assets increased by 9.1% to $5.0 trillion at end-2017, and now account for 9.6% of the narrow measure (Exhibit 4-27). EF5's growth was primarily driven by Chinese trust companies, which accounted for just under 75% of the dollar increase in EF5 assets over 2017 (these entities serve as a funding vehicle for financial institutions). The high rate of growth of these trust companies has taken them from 10.9% of total EF5 assets in 2012 to 24.8% in 2017. The remainder of EF5's growth was primarily due to growth in SFVs.

SFVs grew for the first time since the global financial crisis. This increase reflected growth in 15 of 25 jurisdictions with SFVs, but was concentrated in the Cayman Islands, China, Italy and Luxembourg. Not all jurisdictions saw an increase, however, with some large markets such as the US continuing to see declines in SFV assets.

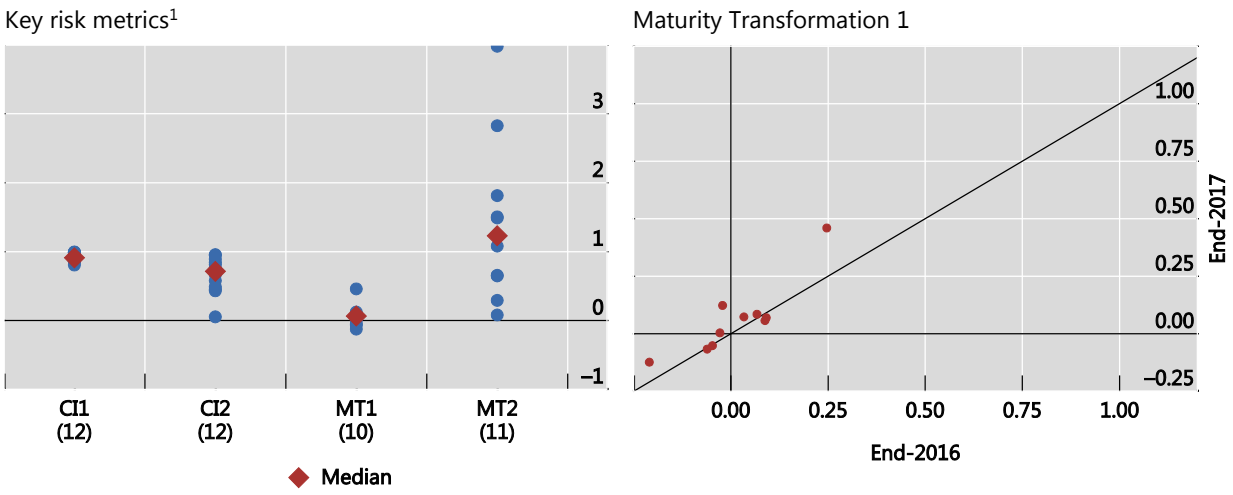
SFV assets increased for various reasons across jurisdictions. In Italy, for example, a new law on public guarantees, operating since June 2016, has helped revitalise the Italian SFV market, which has had a renewed appeal for banks seeking to sell off non-performing loans.

4.8.2 Financial stability risk metrics for EF5

SFVs account for 69% of EF5 assets, and thus the analysis in this section focuses on SFVs and their risk metrics.[117]

- The median value for CI1 (ratio of credit assets to total financial assets) was 0.91 in both 2016 and 2017 (with some variation across jurisdictions), while the median value for CI2 (ratio of loans on the asset side of the balance sheet to total financial assets) was 0.69 in 2016 and 0.71 in 2017. Since the maximum possible value of these ratios is 1, these ratios indicate that SFVs classified into EF5 continue to engage in a significant degree of credit intermediation. The credit intermediation of these SFVs not only consists of buying and holding debt securities, but also loans.
- MT1 (the ratio of long-term assets funded by short-term liabilities) varied above and below zero, with a median value of 0.01 in 2016 and 0.06 in 2017. Several jurisdictions saw their MT1 value increase slightly over 2017 (Exhibit 4-28, LHS). The median MT2 (ratio of short-term liabilities to short-term assets) was 0.94 in 2016 and 1.23 in 2017, indicating a large degree of maturity transformation that is increasing. MT2 varied significantly across jurisdictions, ranging from 0.08 to 3.98.
- The median LT1 (less-liquid assets funded by short-term liabilities, using a narrow definition of liquid assets) was slightly below 1 (at 0.96 in 2016 and 0.98 in 2017), indicating that short-term liabilities are a little less than liquid assets for these jurisdictions (ie no material liquidity transformation).

Risk metrics for structured finance vehicles — Exhibit 4-28



Each blue dot represents a jurisdiction's overall metric, with total sample size denoted in parentheses below the risk metric label on the x-axis. Each jurisdiction's data submission reflects data from many individual entities within that jurisdiction. [1] At end-2017. CI1 = credit assets / total financial assets; CI2 = loans / total financial assets; MT1 = (long-term assets – long-term liabilities - equity) / total financial assets; MT2 = short-term liabilities [≤ 12 months] / short-term assets [≤ 12 months]. Some risk metrics included data from entities prudentially consolidated into banking groups, as some jurisdictions' granular data do not distinguish between consolidated and non-consolidated entities.

Sources: Jurisdictions' 2018 submissions (national sector balance sheet and other data); FSB calculations.

[117] Due to data limitations, some jurisdictions submit data that includes entities prudentially consolidated into banking groups.

5. Case studies

5.1 FinTech credit: Data, classification and policies[118]

The rapidly increasing role of online platforms in extending credit or facilitating credit creation (FinTech credit) has been highlighted by many jurisdictions as a key development in the non-bank financial space since the 2017 monitoring exercise.[119] At a global level, it is estimated that about $284 billion in FinTech credit was extended in 2016.[120] This case study examines the prevalence of FinTech credit across jurisdictions, giving attention to data collection, how FinTech credit is treated in national financial accounts (NFA) and the FSB's annual monitoring exercise, and presents information about whether and how authorities regulate FinTech credit. It is based on a survey among participating jurisdictions conducted in August-October 2018 with 23 respondents.[121]

Key points of the analysis are as follows:

- Almost all responding jurisdictions reported having some FinTech credit activities, but descriptions of FinTech credit business models vary significantly across jurisdictions.
- More than half of respondents already collect some data on FinTech credit and nearly half have plans to enhance data collection.
- Approximately a quarter of respondents have either a formal or informal definition of FinTech credit. The lack of a definition poses challenges for several jurisdictions in their ability to collect data.
- About a third of respondents capture FinTech credit in the NFA (or flow of funds). Over a third of respondents capture FinTech credit in the FSB's annual monitoring exercise, of which the majority classify FinTech credit into Economic Function 2 (EF2).
- Most respondents reported that FinTech credit entities are subject to licensing or registration requirements. While most requirements are the same or similar to those applied to other non-bank financial entities, one-third of respondents reported regulations unique to FinTech credit.

5.1.1 FinTech credit survey and data collection

Collecting information on recent innovations from participating jurisdictions, and discussing their risks and benefits constitute an integral part of the FSB's annual monitoring exercise (see Box 1-2). This case study focuses on an area where increased growth has been reported: FinTech credit. The analysis draws on the survey noted earlier, with a series of

---

[118] This case study was prepared by Carlo Gola (Bank of Italy), Parth Venkat, Emily Gonzalez (US Securities and Exchange Commission), Michael Tochtermann (German Federal Financial Supervisory Authority (BaFin)) and Jon Frost (FSB Secretariat).

[119] See also Box 1-1 of FSB (2018a). For a more detailed overview of these markets and the implications of these activities for financial stability, see CGFS and FSB (2017). For an update on these markets and drivers, see Claessens et al (2018).

[120] Cambridge Centre for Alternative Finance, as cited in Claessens et al (2018).

[121] Argentina, Australia, Belgium, Brazil, Canada, Chile, France, Germany, Hong Kong, Ireland, Italy, Japan, Luxembourg, Mexico, the Netherlands, Saudi Arabia, Singapore, South Africa, Spain, Switzerland, Turkey, the UK, and the US.

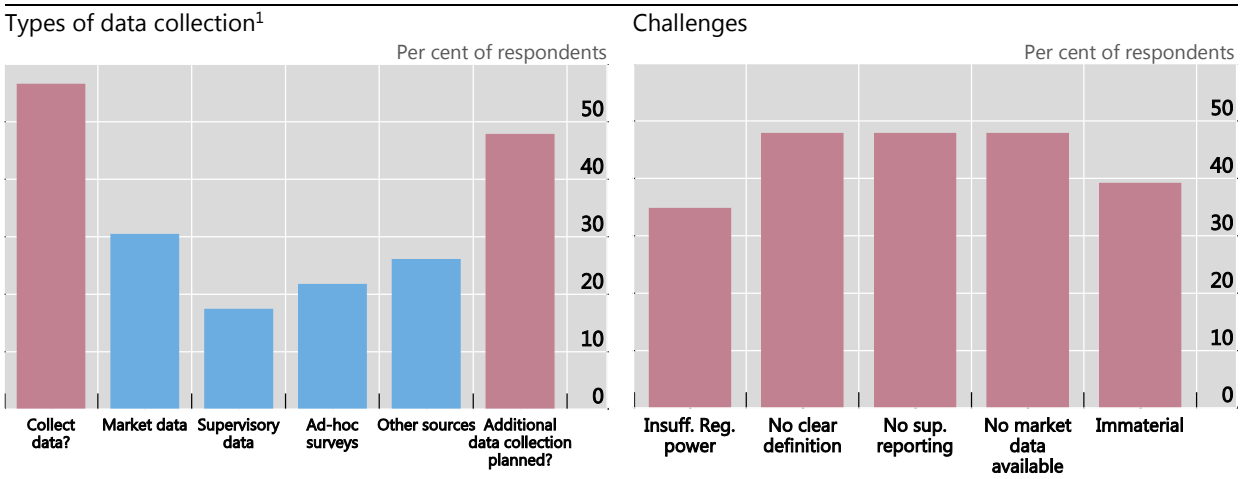
questions related to: (i) jurisdictions' collection of data regarding FinTech credit; (ii) the treatment of FinTech credit in the NFA and the FSB's annual monitoring exercise; and (iii) the current size and regulation of FinTech credit. Among the 23 responding jurisdictions, 21 respondents reported having FinTech credit in their jurisdictions.

FinTech credit can be broadly categorised into: (i) entities not controlled by a financial intermediary whose business model is to facilitate directly or indirectly the granting of loans to borrowers through capital raised from investors; (ii) entities that perform the business model noted in (i) but which are controlled by a financial intermediary (eg "notarised" matching platforms);[122] and (iii) entities that are not part of a banking or financial group, but with a more articulated business model, which includes activities usually performed by financial intermediaries (eg "balance sheet lenders"). Borrowers of FinTech credit may include individuals and/or small businesses, while investors may include retail and institutional investors, such as hedge funds.

The description of FinTech credit varies significantly across jurisdictions. Respondents most commonly reported peer-to-peer (P2P) matching platforms, followed by notarised matching platforms. A few respondents highlighted balance sheet lending, invoice trading and factoring as forms of FinTech credit in their jurisdiction.

More than half of respondents (57%) reported collecting some data on FinTech credit (Exhibit 5-1, LHS). These respondents reported collecting market data (including from industry associations or from individual firms), supervisory data (eg balance sheet, profit and loss statements, and other prudential information), and targeted ad-hoc surveys.

Data collection on FinTech credit — Exhibit 5-1



[1] The first and last columns (in red) present responses to the overall question described in the label (ie "do you collect data?" and "is additional data collection planned?", respectively), while the middle columns (in blue) refer to survey questions on specific data collection types (ie the column represents the percent of jurisdictions that collect each possible source of data).

Source: FSB.

48% of respondents – half of which already collect data – noted plans to collect additional data or to improve current data collection. Some authorities noted that forthcoming regulation of FinTech credit in their jurisdiction (eg licensing or registration of relevant

[122] See CGFS and FSB (2017) for a description of the notary business model.

entities) will lead to improved data collection capabilities.

Authorities were also asked to identify practical challenges in collecting data on FinTech credit from a pre-defined list with six (non-mutually exclusive) options. The top three reasons, each selected by 48% of respondents, were: (i) the lack of a clear definition for FinTech credit; (ii) FinTech credit activities are not currently being included in jurisdictions' supervisory reporting; and (iii) market data not being reliable (Exhibit 5-1, RHS). Additionally, some respondents (35%) stated that their authorities lack sufficient regulatory power, while others (39%) reported that FinTech credit is immaterial in their jurisdiction.

5.1.2 Definitions of FinTech credit

Only 26% of respondents indicated that they have in place formal or informal definitions of FinTech credit. Those jurisdictions that have definitions often refer to a description of specific segments of FinTech credit (eg P2P lending, marketplace lending or lending-based crowdfunding). Other respondents (22%) referred to the definition provided in the CGFS-FSB report[123] or informal/internal definitions that have been used in the assessment of activities and risks associated with FinTech credit. Overall, there is little consistency across jurisdictions.

5.1.3 Treatment of FinTech credit in the NFA and FSB annual monitoring exercise

The second part of the survey focused on the treatment of FinTech credit in the NFA, and in the FSB's annual monitoring exercise. 35% of respondents reported that FinTech credit is captured in their NFA. When asked about specific categories in the NFA, authorities noted that FinTech credit can be included as *deposit-taking corporations* (S.122), *OFIs* (S.125), and/or *auxiliary financial activities* (S.126).[124] Box 5-1 sets out a more detailed discussion of the treatment of FinTech credit in the NFA.

39% of respondents note that they reported FinTech credit in their macro-mapping templates for the 2018 monitoring exercise. Most of these jurisdictions reported that they classified FinTech credit within the narrow measure of NBFI, usually in EF2, which mainly relates to the activities of finance companies. One jurisdiction noted that because there is no liquidity or maturity mismatch, pure matching platforms (eg P2P lenders) may be excluded from the narrow measure. Pure matching platforms are also not considered to be involved in credit intermediation.[125] 45% of respondents (including all those that

---

[123] CGFS and FSB (2017) refer to FinTech credit as "credit activity facilitated by electronic platforms whereby borrowers are matched directly with lenders".

[124] *Deposit-taking corporations* (S.122) include entities which are principally engaged in financial intermediation and whose business is to receive deposits; *other financial intermediaries* (S.125) consist of entities which are principally engaged in financial intermediation. This sector includes financial corporations engaged in lending, and specialised financial corporations; and *auxiliary financial activities* (S.126) are activities *related* to financial intermediation, which do not involve financial intermediation themselves. Auxiliary financial activities comprise activities for realising transactions in financial assets and liabilities or the transformation or repackaging of funds. Financial auxiliaries do not put themselves at risk by acquiring financial assets or incurring liabilities; they facilitate financial intermediation.

[125] EF2 captures loan provision that is dependent on short-term funding. See FSB (2013) and Section 4.5 of this Report for more detailed discussion on EF2. The characteristics of EF2 generally hold true for FinTech credit.

included such activities in the 2018 monitoring exercise) reported that they plan to include FinTech credit in the monitoring exercise in the future.

5.1.4 Size, growth, and licensing and regulation of FinTech credit

Results from the survey indicate that the size of FinTech credit varies widely across jurisdictions. However, due to the lack of data submitted by most jurisdictions in their response to the survey, it is not possible to assess the size of the market both with regard to flows and stocks. In the very limited instances (17%) where respondents provided data on stocks or flows of FinTech credit from 2016-2018, it does appear to be growing rapidly, albeit from a very low base.

The majority of respondents (65%) indicated that some forms of registration or licensing requirements for FinTech credit are currently in place. In most of these cases, the licensing or registration requirements for FinTech credit are no different from those applicable to other non-bank financial entities in these jurisdictions. 30% of respondents indicated that there are specific regulations for FinTech credit that are different from those applicable to other non-bank financial entities.

In a number of cases, if a platform-operating firm carries out a set of activities that require specific licenses (such as deposit-taking, lending and payment services), the relevant regulations apply to FinTech credit entities. In some jurisdictions, where platforms lend directly, these are authorised as "financial institutions". In other jurisdictions, if the platform performs pure brokerage of loans, no prudential regulations are applied to the platform. Instead, there are, for example, annual auditing and fit-and-proper requirements (mentioned by 13% of respondents), indemnity insurance (in at least one case), and consumer protection and AML/CFT (anti-money laundering/combatting the financing of terrorism) rules. Proportionality principles apply in many jurisdictions. In a few cases the licensing process is sped up or simplified through "innovation facilitators".[126]

[126] For further discussion of "innovation facilitators", see BCBS (2018).

FinTech credit and the national financial accounts (NFA) **Box 5-1**

There is no clear definition of FinTech credit in the NFA. The coverage of "online platforms" or "platform-enabled services" is incomplete or not explicitly considered by the United Nations (UN) International Standard Industrial Classification (ISIC).[127] However, the UN handbook on the recording of financial production, flows and stock in the national accounts, and the System of National Accounts (SNA)[128] provides some useful indications on the allocation of assets according to different business models. It is important to consider two aspects: the type of activity performed; and the corporate structure (ie whether the FinTech credit entity is part of a financial group or not).

The UN handbook specifies that *financial intermediation* is the activity in which an institutional unit acquires financial assets and incurs liabilities on its own account by engaging in financial transactions in a market. The assets and liabilities of financial intermediaries are transformed or repackaged. A financial intermediary not only acts as an agent for other institutional units, but "places itself at risk by acquiring financial assets and incurring liabilities on its own account".

For entities that are part of a banking or financial group, the criterion adopted to define the perimeter of the group is relevant. According to the International Financial Reporting Standards (IFRS 10), an investor controls an investee when it is exposed, or has rights, to variable returns from its involvement with the investee and has the ability to affect those returns through its power over the investee. The NFA do not necessarily use the same definition of "group" as described in the IFRS 10.[129] Instead, the NFA focus on "institutional units", the underlying concept of which is based on autonomy of decision-making, compilation of a complete set of accounts, and territoriality.[130] For example, a P2P lender that has decision-making autonomy and needs to publish its own accounts but affects the risks and rewards of the parent banking company is considered by the NFA as an independent institutional unit, but by IFRS as part of the banking group. Similarly, if a P2P lender is a foreign subsidiary is consolidated in the banking group, the NFA will treat it as an independent unit.

---

127 The UN-ISIC defines "Information and Communication Technology" as: manufacturing of semiconductors, computers and communications equipment, software publishing, telecommunications, computer programming, data processing, and web portals. The UN-Central Product Classification (CPC) has a more granular classification, which includes "website hosting services" (Section 8, code 83151). However, crowdfunding platforms fit only partially in this classification.

128 See UN and ECB (2014), European Commission et al (2009), and Eurostat (2013).

129 According to IFRS 10, the control requires: power over the investee; exposure, or rights, to variable returns; ability to use power to affect returns. Moreover, IFRS 10 includes additional guidance on more difficult control assessments including: agency relationships; control over structured entities; potential voting rights; control without a majority of voting rights.

130 An institutional unit is defined as: "an economic entity characterised by decision-making autonomy in the exercise of its principal function. A resident unit is regarded as constituting an institutional unit in the economic territory where it has its centre of predominant economic interest if it has decision-making autonomy and either keeps a complete set of accounts, or is able to compile a complete set of accounts". See Eurostat (2013).

5.2 Recent developments in leveraged loan markets and the role of non-bank financial intermediaries[131]

Global high-yield debt (or leveraged finance) markets, which consist of so-called leveraged loans and high-yield bonds, have grown since 2009 and now exceed their pre-crisis highs.[132] The recent rapid growth of high-yield debt markets, in particular the market for leveraged loans, has attracted attention from several authorities from a financial stability perspective.[133] This case study provides an overview of recent developments in the leveraged loan market, including the rising role of non-bank financial intermediaries, following up on a case study in the 2016 Report. As noted in the discussion below, certain data and statistics (particularly those regarding the end-investors' holding of leveraged loans) are not readily available, and this case study makes use of estimates based on a range of public and regulatory data.

Leveraged loans are loans provided to non-financial corporates that typically have high levels of indebtedness, below-investment grade credit ratings or a spread at issuance higher than a certain threshold.[134] Compared to high-yield bonds that are rated below investment grade, as a general matter, leveraged loans are secured and therefore sit above high-yield bonds in the capital structure, have floating rates, are less difficult to refinance and allow borrowers to keep their financial statements private. Leveraged loans have traditionally offered better creditor protection than bonds given that they normally contained both maintenance and incurrence covenants.[135]

5.2.1 Market size

Roughly $1.4 trillion in institutional leveraged loans, or loans purchased by institutional investors other than syndicate banks, was estimated to be outstanding globally as of October 2018 (Exhibit 5-2). The outstanding amount of leveraged loans is even higher if the amount that syndicate banks retain on their balance sheets (which includes revolving credit facilities, letters of credit and certain term loans) is taken into account. The total market size of leveraged loans is difficult to estimate given that: (i) leveraged loans are private, and therefore transaction data in some cases are not publically available (in particular for the middle market and direct lending segments, where leveraged loans typically are bilateral or not broadly syndicated); and (ii) commercially available data sources vary in methodology and coverage. This results in heterogeneous estimates of the

---

131 This case study was prepared by Claudiu Moldovan (ECB), Steven Dodkins (BoE), Pierre-Yves Gauthier (Bank of France), René de Sousa van Stralen and Peter Wierts (DNB).

132 See BIS (2018).

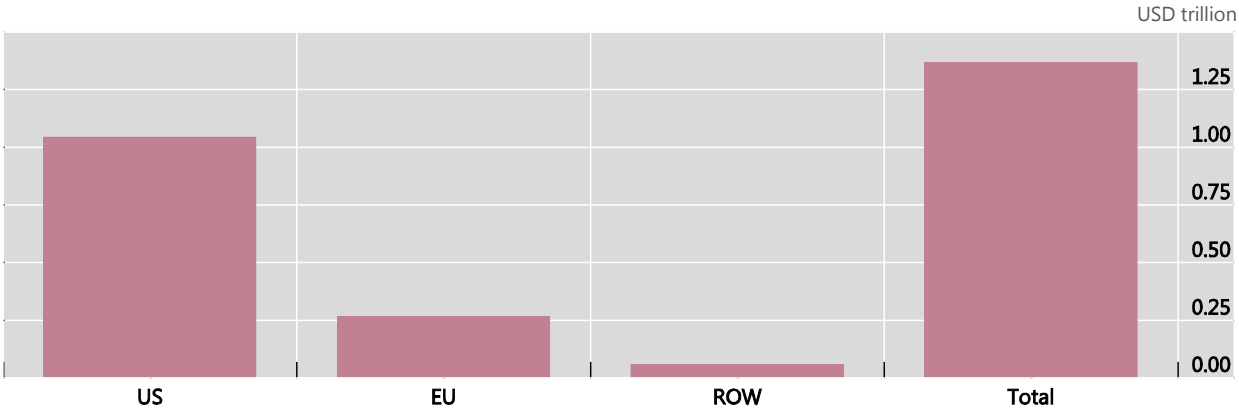
133 For example see BIS (2018), BoE (2018), ECB (2018a), ECB (2018b), FRB (2018), OFR (2018), and IMF (2018).

134 Trade finance and asset-based loans are excluded so as to capture only loans backed by the ability of a corporate to generate earnings, not by specific earnings produced by certain assets.

135 Covenants in loan/bond documentation protect creditors' interests by requiring a borrower to take lower risks and corrective actions when covenants are breached. Maintenance covenants require certain conditions (eg limits to leverage and capital expenditures, or minimum interest coverage ratios) to be met by the borrower at all times. Incurrence covenants prevent the borrower from breaching certain thresholds only when undertaking actions (eg mergers, acquisitions or divestitures, debt issuances, dividend payments or share purchases).

leveraged loan market size, which may amount to as much as $2.2-2.4 trillion.[136] These estimates would increase further if undrawn amounts, which are bank facilities approved but not yet accessed, are taken into account. In comparison, the estimated amount outstanding of global high-yield bonds is around $2.3 trillion.[137]

Global institutional leveraged loans – outstanding amounts Exhibit 5-2



Sources: Federal Reserve; Bloomberg; ECB; and DNB calculations.

5.2.2 Price and non-price developments

The leveraged loan **market has grown significantly against a background of low interest rates and lenders' willingness to extend loans with fewer credit protections**.[138] Moreover, spreads on leveraged loans have become more compressed and the primary market share for leveraged loans composed of the so-called "covenant-lite" loans (ie loans with no maintenance covenants and thus fewer restrictions on the borrower) reached 60-70% in 2018 across most regions, compared to less than 20% pre-crisis.[139]

The level of debt relative to earnings for non-financial corporates that raise funds in the high-yield debt market (HY corporates) has increased significantly. According to an estimate based on a sample of corporates, HY corporate debt has increased faster than earnings (EBITDA)[140] in all regions (Exhibit 5-3). These debt multiples (measured here as gross debt/EBITDA)[141] of HY corporates in general have increased above pre-crisis levels.[142] In some cases, where debt multiples are measured based on pro-forma earnings, such as in the case of leveraged loans issued for mergers and acquisitions (M&A) purposes, actual debt multiples are likely to be even higher than reported debt multiples, as borrowers tend

[136] For example, see BoE (2018) and ECB (2018b).

[137] See ECB (2018b).

[138] This may reflect, in part, a greater prevalence of investors who do not traditionally enforce loan covenants.

[139] ECB calculations based on Bloomberg and Standard & Poor's data.

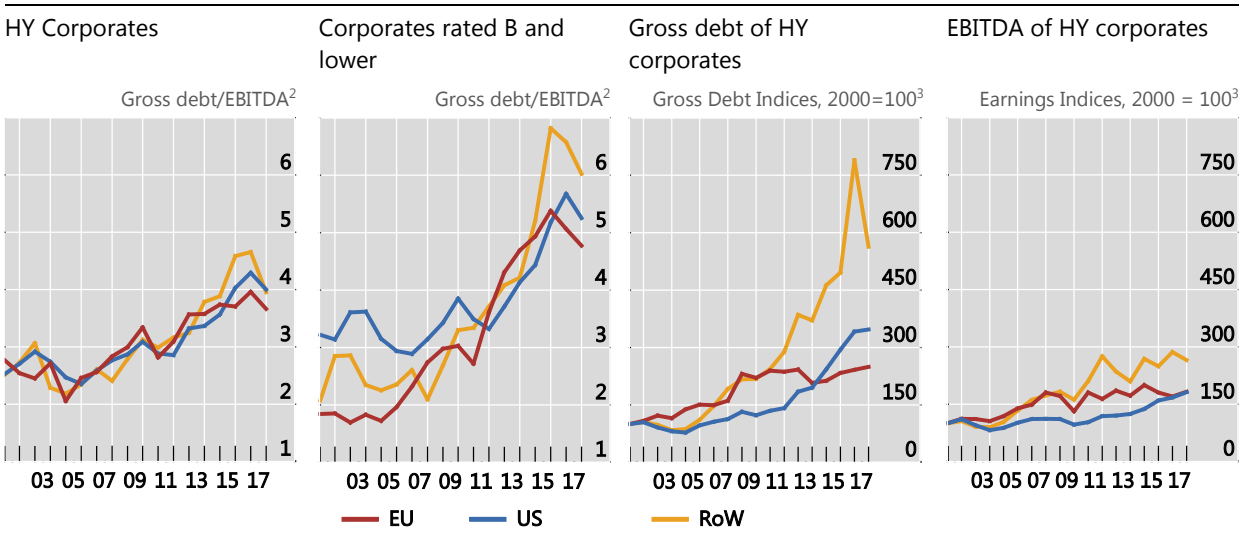
[140] Earnings before interest, tax, depreciation and amortization.

[141] For HY corporates, gross, rather than net leverage may be more appropriate to monitor risk, given that cash and equivalents are not always available to repay debt in the future, as corporates can use them to pay dividends to shareholders. While net debt is lower than gross debt, debt multiples calculated using net leverage would lead to conclusions similar to those using gross leverage.

[142] Other studies using different samples document even higher HY corporates' gross debt/EBITDA. For example, Moody's (2018a) finds global median Debt/EBITDA at 4.9 times for HY corporates.

to make optimistic adjustments to pro-forma EBITDA levels.[143] Corporates sponsored by private equity (PE) firms tend to have higher debt multiples (and lower credit ratings) than non-sponsored companies and play an important role in driving the trend towards higher debt multiples.[144] The compressed spreads and lower creditor protection, together with high-yield debt valuations,[145] suggests that risk levels relative to returns may have increased for investors.

Debt, earnings and debt-to-earnings ratios for publicly listed companies[1] Exhibit 5-3



[1] The values shown for gross debt/EBITDA multiples are calculated as medians of corporate level Gross Debt/EBITDA ratios for a sample of publicly listed corporates. The EU HY sample includes around 70 corporates as of 2000 and 140 as of 2017; the US HY corporate sample includes around 330 corporates as of 2000 and 600 as of 2017; the RoW HY corporate sample includes around 115 corporates as of 2000 and 240 as of 2017. B and lower rated corporates are a subset of the HY corporate sample and account for around a third of the HY corporate sample in all regions. [2] Gross debt/EBITDA is just one of many possible measures of financial distress/pressure. [3] The gross debt and EBITDA values are indices showing gross debt and EBITDA relative to 2000 for corporates in the HY corporate sample; values shown are medians of corporate level indices.

Sources: Capital IQ; ECB calculations.

5.2.3 The role of non-bank financial intermediaries

Another recent development in the leveraged loan market has been the growing role of non-bank financial intermediaries,[146] including entities within MUNFI as described in Section 2. They are becoming influential market players in a number of ways:

- Non-banks have provided an increasingly large share of financing in the leveraged loan market globally after the global financial crisis. For example, non-banks' share in the primary market is estimated at over 70% in the EU (Exhibit 5-4, LHS). Such non-banks include collateralised loan obligations (CLOs), PE funds, retail funds,[147]

[143] See Moody's (2018b).

[144] Moody's (2018c) stated that 92% of the corporates owned by the top 16 PE firms are rated B2 and below, compared to 40% of companies without a PE sponsor.

[145] See FRB (2018).

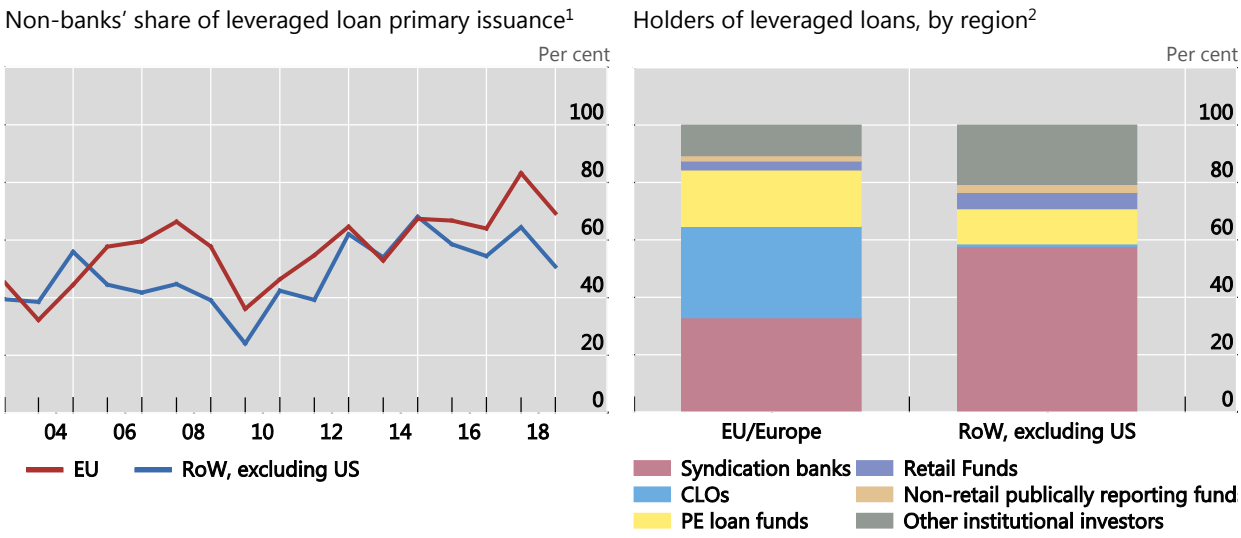
[146] See ECB (2018a) for euro area and IMF (2018) for the US.

[147] It is estimated that retail funds have invested around $140 billion in leveraged loans globally (or 6% of the global holdings), mostly in the form of open-ended mutual funds. Around $10 billion are held by exchange-traded funds

other investment funds and other institutional investors (eg insurance corporations, pension funds).

- In recent years, the way non-banks provide financing in the leveraged loan market has expanded.[148] For example, some non-banks have started to purchase what are typically bank products in the syndicated loan market, such as term loans structured for the syndicate banks and in some cases even revolving credit facilities, rather than just institutional term loans. In addition, an increasing share of leveraged loans has been provided outside the traditional syndication process, via direct lending by non-banks. These developments may imply that the structure of the leveraged loan market is becoming more complex with non-banks taking on non-traditional roles, which also raises potential incentive issues.

Role of non-banks in the leveraged loan market, investor composition — Exhibit 5-4



[1] The non-bank share in the primary market has been estimated as a share of institutional loans (or institutional tranche) in the total loan issued amount in primary markets. [2] The breakdown of investor holdings of leveraged loans is based on total outstanding leverage loan amounts, as well as the amounts held by selected investor types for which holdings could be estimated. Investor shares are calculated by dividing estimated leveraged loan holdings by the estimated amount of leveraged loans outstanding and referencing corporate credits issued by the respective region. The share of syndicate banks is based on primary market leveraged loans not structured for institutional investors. The share of CLOs is estimated by the size of the CLOs tranches issued in euro or UK pound (EU/Europe). The share of retail funds is estimated from publically disclosed fund holdings of leveraged loans. The share of PE funds is estimated based on the amount invested by PE sponsors in loan funds and funds of funds investing in non-financial and non-real estate corporate loans.

Sources: Bloomberg; ECB calculations.

- CLOs are supporting high leveraged loan market growth. CLO issuance has been particularly strong over the past two years, with issuance nearing or exceeding pre-crisis levels, and around $700 billion outstanding globally.[149] It is estimated that CLOs hold around 30% of the leveraged loans outstanding in the EU (Exhibit 5-4, RHS), or half of the institutional loans issued in the EU. In the US, it is estimated that CLOs purchase roughly 60% of leveraged loans in the primary market and loan funds

(ETFs). A further $80 billion of leveraged loans are held by publically reporting institutional funds. Based on ECB calculations and Bloomberg data.

148 See for example Euromoney (2018).

149 ECB estimated, based on Bloomberg and SIFMA data.

purchase about 20%.[150] Because CLOs serve as repackaging vehicles for the underlying leveraged loans, information about the end-investor base (which may include banks) may not be known.[151] An estimate based on a range of public and regulatory data, suggests that around two-thirds of global CLOs are held by non-bank investors, including pension funds, insurers and investment funds. International banks hold the remaining third (typically the less risky tranches).[152]

- PE firms (or funds they manage) have increased their role in the leveraged loan market. PE firms have increasingly played various roles in the leveraged loan market since the financial crisis. For example, they borrow to finance M&A activities and act as institutional investors. Some PE firms also have affiliates that create CLOs to purchase and distribute leveraged loans. It is estimated that PE funds, both those owned by PE sponsors and those employing the PE ownership structure, have provided at least $140 billion in loans to non-financial, non-real estate, corporates, particularly in the direct lending and middle market segments of the leveraged loan markets.[153] Such funds are estimated to hold around a fifth of issued European leveraged loans (Exhibit 5-4, RHS).
- Other institutional investors include credit funds, pension funds and insurance corporations. Statistics are not readily available for such investors, which are estimated to account for up to a fifth of the outstanding leveraged loans. Credit funds, which include hedge funds, are estimated to account for a significant share of "other institutional investors".[154]
- While the relative role of banks has decreased, they remain a key player in the leveraged loans market**.** Syndicate banks are estimated to directly hold around a third of leveraged loans outstanding in the EU. In addition, some banks are likely to have further indirect exposure to the leveraged loan market, some of which is unlikely to be captured by the available statistics.[155]

5.2.4 Conclusion

Strong demand for high-yield debt has been accompanied by lower covenant protection for lenders/investors. As leveraged loan issuance has increased, so too has the debt-to-EBITDA of corporate borrowers to levels higher than pre-crisis, according to an estimate based on a sample of corporates comprised of B or lower rated corporate borrowers. Given that debt-to-EBITDA of these corporates has increased as a result of corporate debt increasing faster than earnings in all regions, these corporates may have less financial flexibility and be more dependent on capital markets for refinancing.[156] As such, they may

---

[150] See FRB (2018).

[151] Since CLO securities are sold in private placements pursuant to an exemption from registration under relevant national securities laws in some jurisdictions, information about CLOs and the underlying leveraged loans is not readily available to regulators.

[152] See BoE (2018).

[153] ECB estimates, based on Bloomberg data.

[154] See Fitch Ratings (2016).

[155] These indirect exposures include direct holdings of CLO tranches.

[156] See Standard & Poors (2018).

be more vulnerable to economic downturns, to liquidity stress and potential defaults. Furthermore, while credit spreads increased at the end of 2018 in the major high-yield debt markets, many investors that invested over the past years at post-crisis low credit spreads may have underpriced the weakening in covenant quality as well as the risks presented by an increase in corporate indebtedness. Non-banks have increased their investments in high-yield debt, particularly in leveraged loans. In fact, available data suggests **non-banks purchase the majority of leveraged loans in the primary market and therefore have greater exposure to potential adverse market developments.** It is noteworthy that there may be cases where such non-banks with appropriate risk management could contribute more to financial stability than other leveraged investors (including banks).

Developments in the leveraged loan market warrant close monitoring given the potential for spillovers to other markets. Such spillovers may come as the result of developments such as an unexpected spike in the corporate default rate and/or sharp market repricing. Some of the structural changes discussed above, such as the increased gross debt/EBITDA and weakened underwriting standards, may serve as amplifiers for losses experienced in the leveraged loan market.

Given these developments, the complexity and lack of transparency (ie data constraints) of the leveraged loan market, as well as the potential of spillovers to other markets, it is important to consider enhancing data/information collection so as to have clearer view of the market and its risks. For example, while CLOs and other funds are intermediate vehicles redistributing risks, it is important to understand who the ultimate risk holders are. The potential impact on financial stability depends, in part, on whether entities that ultimately hold these risks have the capacity to withstand potentially significant price changes or defaults, and, if not, whether those ultimate risk holders are of systemic importance.

5.3 The non-bank credit cycle[157]

The 2017 Report included an assessment of non-bank credit across several jurisdictions, based on historical data, and an empirical analysis of the non-bank credit cycle.[158] This case study builds on that assessment and examines the cyclical characteristics of bank and non-bank credit across jurisdiction groupings, as well as the synchronisation of these cycles across jurisdictions. Furthermore, it assesses if non-bank credit could act as a leading indicator for financial crisis periods.[159]

5.3.1 Data

Credit to the non-financial private sector consists of the loans and debt securities on the liability side of the balance sheets of households and corporates, and may be provided either by banks or non-banks. Non-bank credit is provided by a broad range of domestic and foreign lenders, including insurance corporations, pension funds, other financial intermediaries (OFIs),[160] in addition to the government.

A sample of 36 jurisdictions is used in this study.[161] The measures of non-bank and bank credit are computed using the BIS long series database on private[162] non-financial sector credit[163] and the BIS locational banking statistics, from 1971 first quarter (Q1) up to 2017 Q3. As a first step towards estimating non-bank credit, bank credit is subtracted from total credit, with bank credit defined as all loans and debt securities held by domestic banks. What remains encompasses loans provided, and debt securities held, by all other sectors of the economy (eg insurance corporations, pension funds, investment funds, other firms, households) and, for some jurisdictions, direct cross-border lending by foreign banks (ie non-resident bank loans). These cross-border loans by foreign banks are subtracted in a second step. What results is the measure of non-bank credit used in this case study:

> ***Non-bank credit to private non-financial sector (PNF)*** *≈ All sector credit to PNF – (Domestic) Bank credit to PNF – foreign bank loans to PNF.*

---

157 This case study was prepared by Esti Kemp (FSB Secretariat), Alexandros Vardoulakis (Board of Governors of the Federal Reserve System (FRB)), Peter Wierts and René de Sousa van Stralen (DNB).

158 See Annex 3.1 of FSB (2018a).

159 For further analyses see Kemp et al (2018).

160 As defined in this Report.

161 This sample includes 36 jurisdictions. They are: Austria, Australia, Belgium, Brazil, Canada, Switzerland, Chile, China, the Czech Republic, Germany, Denmark, Spain, Finland, France, Hungary, Indonesia, Ireland, Israel, India, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Norway, New Zealand, Poland, Portugal, Russia, Sweden, Singapore, South Africa, Turkey, the UK and the US.

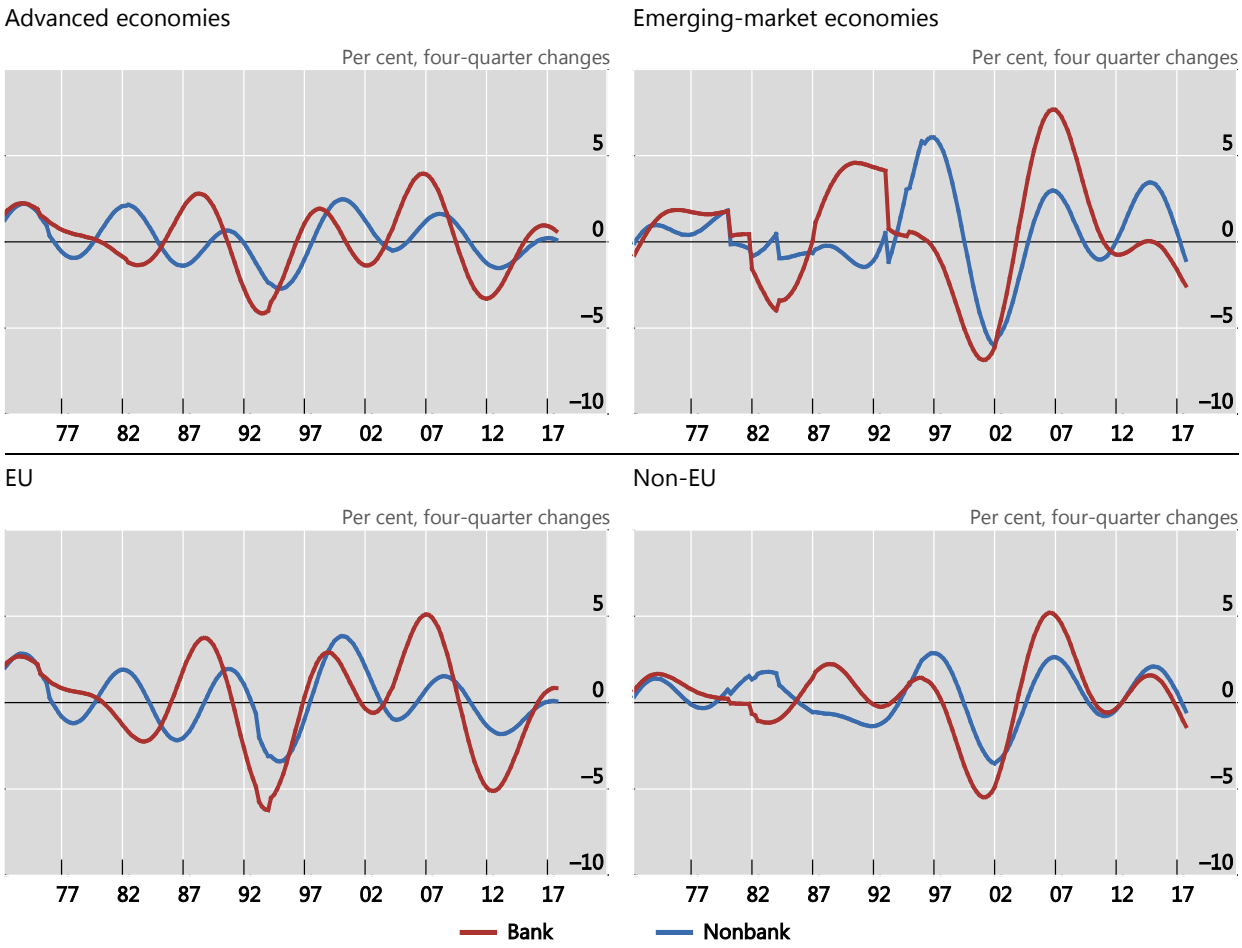
162 In this context, "private" refers to non-government.

163 Private non-financial sector credit "includes non-financial corporations (both private-owned and public-owned), households and non-profit institutions serving households as defined in the System of National Accounts 2008" and does not include governmental credit. See BIS (2018). For the details concerning the estimation of measures of total and bank credit, see Dembiermont et al (2013).

5.3.2 The non-bank credit cycle and its interaction with the bank credit cycle

Credit growth cycles are calculated by applying the Christiano-Fitzgerald[164] filter to non-bank and bank credit series for each jurisdiction. The amplitudes of the bank and non-bank cycles vary significantly across jurisdictions, reflecting the differing growth rates in non-bank credit over time. Exhibit 5-5 illustrates bank and non-bank growth rate cycles for various groupings of jurisdictions, namely EMEs, advanced economies, EU, and non-EU jurisdictions. These cycles were calculated using the unweighted average growth credit cycles of the jurisdictions in these groupings.

Bank and non-bank credit growth cycles, by jurisdiction grouping[1] Exhibit 5-5



[1] Since these are growth rate cycles, a negative value indicates a decrease in the level of outstanding credit in real terms, while increases are present when the growth cycles are positive. When the cycle is positive but declining, the cycle in levels is still increasing but at a decreasing rate. A turning point is therefore indicated when the growth rate cycle reaches zero. The advanced economy sample comprise 25 jurisdictions, the emerging market econonmies sample comprise 11 jurisdictions, the EU sample comprise 17 jurisdictions and non-EU sample comprise 19 jurisdictions.

As can be seen in Exhibit 5-5, within jurisdictional groupings the relationship between bank and non-bank credit cycles has changed over time. In certain periods the bank and non-bank credit cycles are negatively correlated, thus moving in opposite directions, for example in the late 1970s to the early 1990s in advanced economies. In other periods the cycles were positively correlated, for example in all the jurisdictional groupings in the

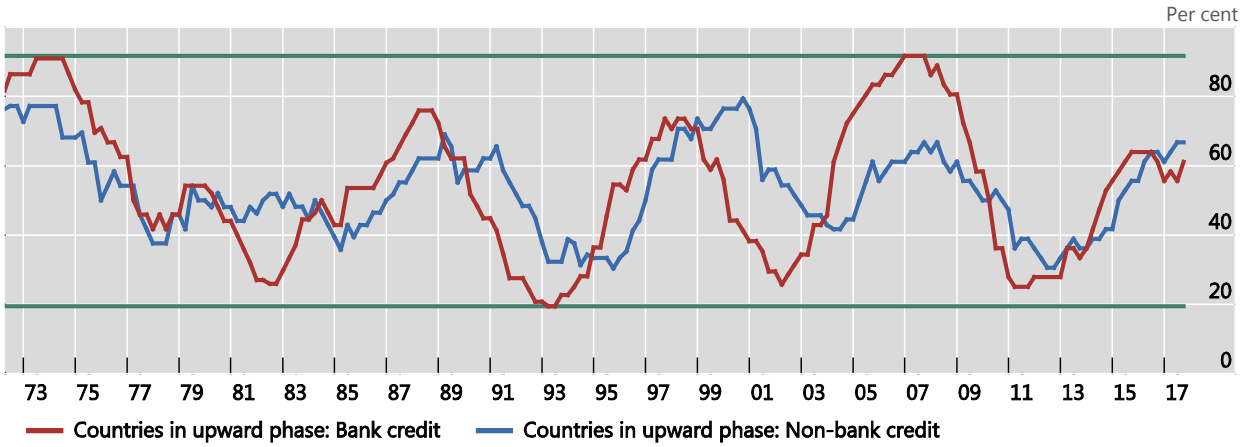
[164] See Christiano and Fitzgerald (2003).

period leading up to the global financial crisis. The period before the global financial crisis (2007-09) stands out as a period with a strong upturn in bank credit cycles in all groups, while non-bank credit also shows a peak around that time, or slightly later. The downward cycle in bank credit is more severe in advanced and EU economies.

Further insight into global bank and non-bank credit cycles is obtained by examining the number of jurisdictions that were in an expansionary phase in any given period. Exhibit 5-6 shows the percentage of jurisdictions that were in an upward phase of the bank or non-bank credit cycle, respectively.

Percentage of jurisdictions in an expansionary phase in any given period for bank and non-bank cycles

Exhibit 5-6



Note: The green line shows the maximum and minimum values, during the sample period, of the percentage of jurisdictions that experience an upward phase in the bank credit cycle.

Non-bank credit growth cycles across jurisdictions appear to be less synchronised than bank credit growth cycles, given the higher (and lower) percentage of jurisdictions experiencing an upward phase in the bank cycle at the same time. For example in 45 quarters, bank credit growth cycles in more than 70% of the jurisdictions were in an upward phase, compared to only 21 periods for non-bank credit. In the period leading up to the global financial crisis more than 90 per cent of the jurisdictions (ie 33 out of the 36 in the sample) were in an upward phase of the bank credit growth cycle – this is the highest number during the sample period.

The higher percentage of jurisdictions in an upward phase at the same time for bank credit, on average, could be attributed to a number of reasons. Banks are more homogeneous as a group of lenders, and large banks often operate across jurisdictions. Moreover, they are prudentially regulated – ie they are a group of financial intermediaries recognised and subject to similar regulation across jurisdictions. Non-bank credit is provided by a more diverse group of lenders, where the underlying financial intermediaries may not be as internationally connected as banks. However, at the same time non-bank credit flows can be driven by international developments, especially when non-bank credit is provided through the international bond markets, which may be highly integrated.

5.3.3 Non-bank credit and financial crises

Existing research on financial stability has mainly focused on bank or total credit. Previous studies have already established a link between credit cycles and banking or currency

crises.[165] However, less research has been conducted on the role of non-bank credit.

Using regression analyses and the crises database of Laeven and Valencia,[166] a binary crisis indicator $C_{i.t}^{j}$ is created which takes value one if a crisis of type $j \in \{all,\ systemic,\ currency,\ sovereign\}$ occurred in county i in year t, and takes value zero otherwise. In particular, the following logit-panel regression was estimated:

$$logit\left(C_{i.t}^{j}\right) = \beta X_{i,t-1} + \gamma \Gamma_{i,t-1} + \theta_i + \varepsilon_{i,t},$$

where $logit\left(C_{i,t}\right) = log\left(C_{i,t}/(1 - C_{i,t})\right)$ is the log of the odds ratio, $X_{i,t-1} = \Delta^4 \log(real\ credit_{t-1}) = \log(real\ credit_{t-1}) - \log(real\ credit_{t-5})$ is the lagged four-year growth of real total credit, real bank credit or real non-bank credit, $\Gamma_{i,t-1}$ is the vector of lagged control variables, and θ_i are the cross-sectional (country) fixed effects. Since crises are rare events, the use of fixed effects creates identification issues. As a result, country-level fixed effects, but no time fixed effects, are used. The lagged one-year real GDP growth ($\Delta^1 \log(real\ gdp_{t-1})$) and lagged inflation is also included, in line with other studies.[167, 168]

The estimation results suggest that non-bank credit growth - or equivalently the non-bank credit cycle - can act as a leading indicator for currency crises and, albeit more weakly, for sovereign debt crisis (this result is more uncertain due to the low number of sovereign debt crises). This result is in sharp contrast to total or bank credit growth, which are not helpful in predicting the incidence of currency crises. On the contrary, it was observed that bank credit growth is a useful leading indicator for systemic banking crises, while non-bank credit growth fails to predict such incidences. It is a possibility that non-bank credit could better explain currency crises due to the reversal of capital flows resulting in sudden stops, especially for credit provision through corporate bonds. Although additional analysis is needed to uncover the underlying mechanism, panics related to sudden stops around currency crises could be better tied to reversals in non-bank credit.

5.3.4 Conclusion

This case study shows that within groupings of jurisdictions, the relationship between non-bank and bank credit cycles changes over time, and that bank credit cycles appear to be more synchronised across jurisdictions than non-bank credit cycles. It complements the existing research on leading indicators for financial crises by confirming that bank credit is a useful indicator for systemic banking crises, while non-bank credit may be helpful to predict currency crises. These observations highlight the value added of monitoring non-bank credit in addition to the traditional focus on bank credit. The large and growing literature on financial cycles and credit cycles can be complemented by further research on non-bank credit cycles.

---

[165] See Borio and Lowe (2002), and Schularick and Taylor (2012).

[166] See Laeven and Valencia (2012).

[167] For example, see Danielson et al (2018).

[168] We have also considered four-year real GDP growth and four-year inflation as control variables and we obtain the same results. We have opted for one-year lagged control because GDP and inflation should respond to economic condition faster than credit aggregates and may capture the incidence of crises in a more timely manner.

5.4 Cross-border co-movement between NBFI systems[169]

This case study offers an overview of cross-border co-movement among NBFI systems as defined by OFIs.[170] It provides insight on the potential for material financial interconnectedness between domestic and foreign financial intermediaries in recent years (see Section 3). Such interconnectedness could provide a channel for propagating adverse financial shocks across jurisdictions in times of heightened stress.

In this case study, co-movement is defined to occur when changes in OFI financial assets in a jurisdiction occur, given changes in OFI financial assets in another jurisdiction. This cross-border co-movement does not refer to the direct financial interconnectedness among NBFI systems discussed in Section 3, because cross-border interconnectedness is composed of highly complex linkages which require granular data to quantify. In contrast, the co-movement of OFI asset growth discussed here could be an alternative measure, which could provide insight on how NBFI systems are correlated across borders. As the co-movement measure can be regarded as part of the combined effect of the highly complex linkages and factors, it may partially reflect the potential for cross-border spillovers of financial shocks originating from a NBFI system. Furthermore, this measure can help assess the potential impact of shocks originating from macroeconomic and financial conditions, a topic commonly discussed in the empirical literature of banks, currency markets and sovereign bond markets.[171] This case study attempts to shed light on potential for spillovers among the NBFI systems across markets and borders by examining the strength of: (i) cross-border NBFI systems co-movements; and (ii) the major factors associated with the co-movement.

5.4.1 Data and empirical observations

i) Data and model

This case study relies on the *29-Group* sample of OFI assets used throughout this Report (see Section 1), but excluding equity fund assets. Equity fund assets are excluded because their values are primarily driven by fluctuations in stock market prices, which are highly correlated across borders.[172] The removal of these funds therefore may prevent the estimated cross-border linkages from being distorted by changes in global stock market sentiment.

Two econometric analyses are undertaken. The first untangles the complex network of cross-border relationships by measuring bilateral co-movements between jurisdictions' OFI assets (ie by measuring the empirical change in the asset growth of one jurisdiction's OFIs given a change in the asset growth of another jurisdiction's OFIs, using 29x29 regressions to assess each jurisdiction pair individually). Two dummy variables are used to compare changes at different levels of the US stock volatility index (VIX) and to compare

---

[169] This case study was prepared by Tom Fong (Hong Kong Monetary Authority) and Justine Plenkiewicz (CIMA).

[170] Unlike OFIs in the rest of this Report, the OFIs discussed in this case exclude equity funds.

[171] Some major studies include Longstaff et al (2011), Habib and Stracca (2012), Cyree et al (2000).

[172] Some other entities (eg fixed income funds, mixed funds) may also have large exposures to equities and therefore be responsive to stock market valuations, although the significance may not be consistent across entities and jurisdictions. This may impact the empirical results.

changes in recent years with early years.[173] Based on these dummy variables, the changes in three episodes were assessed. The first two episodes cover years prior to 2015 with (i) the VIX being below its 75th percentile,[174] and (ii) the VIX exceeding its 75th percentile (which assumes a probability of 25% that the global liquidity condition goes beyond the VIX level). The last episode covers (iii) from 2015-17, during which the VIX fell below its 75th percentile.[175]

The second econometric analysis identifies major driving factors among OFIs by looking at global expected earning yield, asset size of institutional investors, asset size of the banking sector, and bank concentration.[176, 177] A lower forward earnings yield could be a driver as it could decrease investors' investment in stocks and bonds, but increase their investment in OFIs. Higher asset growth in institutional investors could be a driver as it may be associated with stronger demand from these investors. A sizable banking sector could be associated with more credit availability in the financial markets. Finally, a higher bank concentration could be associated with a less-stable banking sector, which regulators might respond to by tightening capital regulations, resulting in higher capital stringency in the banking sector.

ii) Observations

First, significant increases in the cross-border co-movement between OFIs were observed during the "high VIX" period. These linkages remained strong in the 2015-17 period, despite the low VIX level. Exhibit 5-7 reports the estimated change in OFI assets of one

---

[173] Specifically, we regress the time series of the OFI growth of the *i*-th economy (denoted by $\Delta OFI_{i,t}$, for *i* = 1,..., *29*) on the OFI growth of the *j*-th economy (denoted by $\Delta OFI_{j,t}$ for *j* = 1,..., 29) and other variables: $\Delta OFI_{i,t} = (\theta_{i,0} + \alpha_{i,j} + \beta_{i,j}) + (\theta_{i,1} + \alpha_{i,j} + \beta_{i,j})\Delta OFI_{j,t} + \theta_{i,2}\Delta OFI_{i,t-1} + u_{i,j,t}$, where $\theta_{i,0}$ and $\theta_{i,1}$ are the constant term and slope of the growths; $\alpha_{i,j}$ and $\beta_{i,j}$ are dummies of high-VIX level and recent years (ie 2016 and 2017); $u_{i,j,t}$ is an error term; and the lagged term of $\Delta OFI_{i,t}$ is added to control for the second round effect of the OFI asset growth in the previous year. The co-movement measure refers to the average of these coefficients, ie $(1/29)\sum_{i=1}^{29} \theta_{i,1} + \alpha_{i,j} + \beta_{i,j}$, by geographical region.

[174] The VIX is commonly regarded by market participants as a measure of global market liquidity and risk appetite of global investors. Details can be seen in Forbes and Warnock (2012), Bruno and Shin (2015) and Rey (2018).

[175] The low-VIX periods cover 2002-06, 2009-10, and 2012-14, during which financial markets were relatively tranquil, while the high-VIX periods cover 2007, 2008, and 2011, during which the global financial markets underwent the global financial crisis and European debt crisis. From 2015-17, VIX fell to its pre-crisis level (ie levels seen in 2006 and 2007).

[176] We regress the OFI asset of the *j*-th economy at time *t* on four driving factors, denoted by $MV_{j,t}^{k}$, or: $OFI_{j,t} = \theta_{j,0} + \sum_{k=1}^{4} \theta_k MV_{j,t}^{k} + \gamma OFI_{j,t-1} + \epsilon_{j,t}$, where $\theta_{j,0}$ is the cross-sectional fixed effect and $\epsilon_{j,t}$ is the residual of the model. A lagged term of OFI assets is also added as a control variable for the second round effect of the system. The regression is estimated by generalised method of moment which uses instrumental variables to address the endogeneity issue among explanatory variables. These instrumental variables are selected to be the lagged terms of explanatory variables in this study. In this specification, all variables are measured in log-level terms, so each coefficient of the factors is regarded in terms of elasticity, which measures how responsive the OFI asset is to change in each of the factors in percentage terms.

[177] Four factors were included: investors' expected earning yield (forecasted earnings per share of the MSCI World Index divided by the current price of the MSCI World Index); institutional investor size (total asset size of pension funds and insurance corporations of jurisdictions); bank asset size (total assets of deposit-taking corporations of jurisdictions); and bank concentration (ratio of the assets of top three largest banks to the assets of all commercial banks for each jurisdiction). These variables are also considered by the IMF (2014) and major studies in literature, but using the global expected yield to measure investors' expected yield in the near term instead of term spread and interest rates. The IMF also considers real GDP growth to be a driving factor of the growth in NBFI. Other potential factors (eg global economic growth, global valuation pressure, secular market forces, safe asset demand) may also be important drivers of NBFI growth and co-movement. These estimation results may therefore be still subject to omitted variable bias.

jurisdiction given a change in OFI assets of another based on averaging the estimated coefficients for each geographical region. During the low-VIX period (see Panel A), the estimated change is 12% on average. This means that a jurisdiction's OFI assets increase on average by 1.2 percentage point given a 10-percentage-point increase in any other jurisdiction's OFI assets, other things being equal. During the global financial crisis (see Panel B), the estimated change rises to 67% on average. In the recent years (see Panel C), the estimated change stands at 68%, albeit insignificantly on average, while the estimated changes given a change in OFI assets of most jurisdictions remain unabated (see the column averages; eg, the change would be 123% on average given a change in developed Asia but only 5% given a change in emerging Asia).

Estimated changes in a jurisdiction's OFI asset growth given a change in another jurisdiction's OFI asset growth

Exhibit 5-7

Estimated changes in a jurisdiction's OFI growth	Given a change in the OFI asset growth of the following jurisdiction						
	Developed Asia	Emerging Asia	EMEA	Developed Europe	Latin America	North America	Row[2] Average
Panel A: Periods of a low VIX level during 2002-2014							
Developed Asia	-0.22	-0.15	0.16	0.22	0.15	0.39	0.09
Emerging Asia	0.08	-0.18	0.05[1]	0.33	0.14	0.00	0.06
EMEA	0.07	0.17	0.07	0.37	0.19	0.18	0.19*
Developed Europe	0.13	0.08	0.10	0.51	0.09	0.43	0.22
Latin America	0.03	0.13	0.05	0.10	0.00	0.11	0.07
North America	0.09	0.00	0.10	0.21	0.11	0.00	0.09
Column Average[2]	0.03	0.02	0.09**	0.30**	0.10	0.18	0.12
Panel B: Periods of a high VIX level during 2002-2014							
Developed Asia	0.50	0.68	0.45	0.91	0.64	1.65	0.80**
Emerging Asia	0.66	0.37	0.52[1]	0.91	0.85	1.94	0.88*
EMEA	0.85	0.59	0.17	0.71	0.81	1.09	0.70**
Developed Europe	0.27	0.21	0.23	0.51	0.29	0.90	0.40*
Latin America	0.24	0.37	0.25	0.49	0.84	1.03	0.54*
North America	0.49	0.58	0.29	0.70	0.54	1.51	0.68*
Column Average[2]	0.50**	0.46**	0.32**	0.70**	0.66**	1.36**	0.67*
Panel C: Recent years (2015-2017)[3]							
Developed Asia	1.64	0.31	0.46	0.69	0.51	1.08	0.78*
Emerging Asia	1.22	-0.35	0.31[1]	0.58	0.29	0.75	0.47
EMEA	0.96	-0.10	0.31	0.76	0.41	1.26	0.60
Developed Europe	1.42	0.36	0.44	0.74	0.46	1.07	0.75*
Latin America	1.84	0.15	0.61	0.82	0.60	1.79	0.97
North America	0.31	-0.04	0.22	0.61	0.33	1.74	0.53
Column Average[2]	1.23**	0.05	0.39**	0.70**	0.43**	1.28**	0.68

[1] This table summarises the estimation results of regressions of OFI growth of one jurisdiction on the growth of another, with white heteroskedasticity-consistent standard errors and covariance. The reported figure in each cell is the average of the estimated coefficients. Panel A and Panel B report the level of sensitivity in tranquil period (low VIX) and global liquidity stressful period (high VIX) during 2002-2014 respectively. Panel C reports the level of sensitivity during 2015-2017. For examples, a 100%-point increase in the OFI growth of EMEA would increase the OFI growth in emerging Asia by 5%-point during the tranquil period, and by 52%-point during the stressful period but only 31%-point in the recent years. [2] Significance at 0.05 and 0.1 levels are indicated by ** and * respectively. [3] From 2015-17, VIX fell to its pre-crisis level (ie levels seen in 2006 and 2007).

Sources: Jurisdictions' 2018 submissions (national sector balance sheet and other data); FSB calculations.

Second, the co-movement is significantly associated with investors' global expected earning yield, demand from institutional investors, and funding support from the banking sector (Exhibit 5-8).[178] These factors are equally important in the full sample period, while the global expected yields are the largest factor, followed by bank size and size of institutional investors (these factors are, however, of similar magnitude) in the 2015-17 period.[179] This implies that a stronger co-movement is associated with lower investors' expected return, stronger demand from institutional investors and funding support from the banking sector, with the effect of investors' expected investment returns being considerably stronger among these factors in recent years.

Major driving factors of OFI co-movement[1,2] Exhibit 5-8

Independent variable (in log)	Full period[3] (2002-17)	Tranquil[3] (VIX <=75%)	Stressful[3] (VIX > 75%)	Recent years[3] (2015-17)
Global expected earning yield	-0.159*	-0.047	-0.703**	-1.514**
Institutional investors size	0.115**	0.169**	0.110	0.121*
Bank size	0.104*	0.071	0.150**	0.129*
Banks' concentration	-0.145	-	-	-
Constant / Dummy variables	0.666	-0.098	-2.116**	-4.420**
Lag dependent variable	0.746**		0.776**	
N	356		385	
Sargan statistics[4]	276		266	
Pseudo Differenced R-squared	0.0832		0.1268	

[1] This table reports regression results of OFIs on the selected explanatory variables based on a dynamic panel data regression model (with lagged explanatory variables as instruments). Significant variables can be regarded useful to explain the co-movement of OFIs since we observe that the residuals extracted from the regression are insignificantly linked across jurisdictions in general. Technical details can be seen in Fong et al. (2018). [2] Significance at 0.05 and 0.1 levels are indicated by ** and * respectively. [3] The first column reports the results of full period regression. The second column reports the regression results for various market conditions and periods. [4] The Sargan statistic is large enough to reject the null hypothesis of over-identifying restrictions on the instrumental variables of the panel data regression.

Sources: Jurisdictions' 2018 submissions (national sector balance sheet and other data); FSB calculations.

5.4.2 Potential implications from this co-movement

In sum, OFI assets can move together, notably in times of global stress and such co-movement is weak in tranquil (or low-VIX) periods. Although in the two most recent years the VIX level lowered to the pre-crisis level, the cross-border co-movement of NBFI systems remained comparable with those seen in the stressful periods. The stronger co-movement in the recent years is associated with lower investors' expected investment return, stronger demand from institutional investors and funding support from the banking sector.

There are several potential implications. First, cross-border co-movement was observed to be associated with both the VIX level and low-yield expectations. Given the continuing low-yield environment during the past two years, the relevant authorities should be mindful of the potential changes in their regulated institutional investors' exposures to NBFI whenever a trend of low yield expectations develops. Monitoring of institutional investors

[178] We first estimate a dynamic panel data regression of the OFIs asset sizes on these variables, extract the residuals from the regression and observe that they are insignificantly linked across jurisdictions, suggesting that the selected explanatory variables would have an explanatory power on the interconnectedness of OFIs. For details, see Fong et al (2018).

[179] The coefficients are comparable because they measure the economic elasticity of the explanatory variables which means the responsiveness of the OFI asset to change in the variable in percentage terms.

(eg investment funds and pension funds) may be helpful in responding to a potential shock that could result from the growth and increased co-movement in NBFI systems.[180]

As the regular banking sector remains one of the most important funding sources of non-bank financial entities, the financial linkages between banks and non-bank financial entities may warrant close monitoring for addressing potential spillovers between the two sectors.

Finally, the strength of the cross-border co-movement of NBFI systems highlights the benefits of jurisdictions working closely together to avoid adverse developments in these systems. In particular, a monitoring framework could be considered to assess in greater granularity the cross-border co-movement during periods of stress.

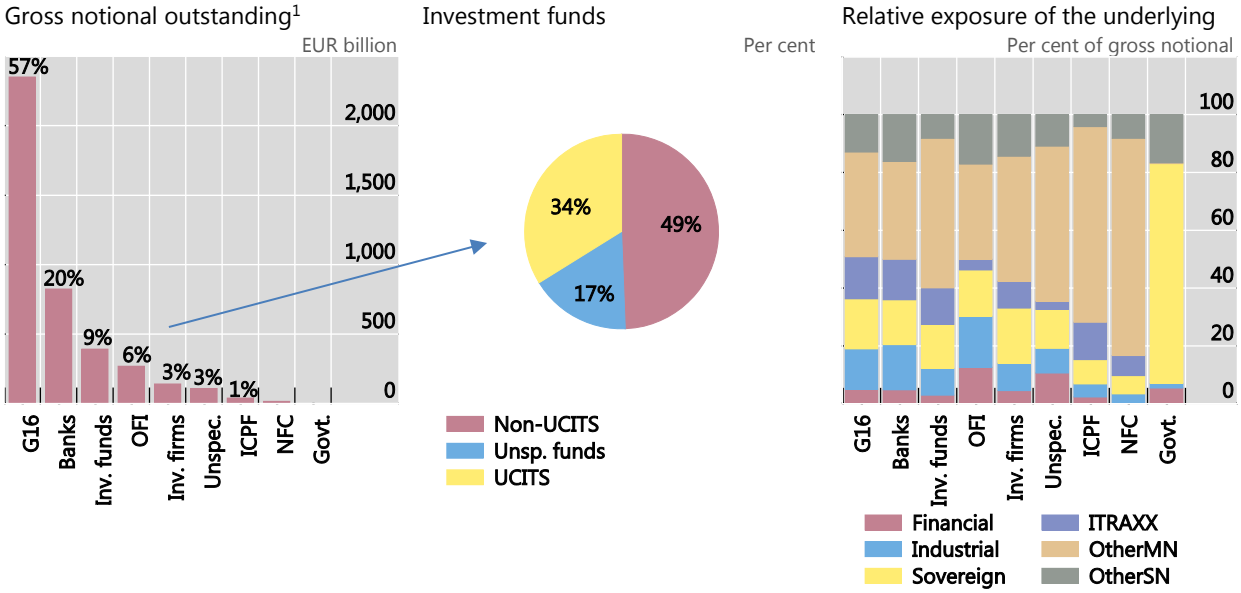
[180] The negative effect of these institutional investors can cause or exacerbate financial instability (ie be pro-cyclical) (see BoE and the Procyclicality Working Group (2014), Papaioannou et al (2013) and OECD (2010)).

5.5 Use of CDS by non-bank financial institutions in the EU[181]

Since the Pittsburgh G20 Summit in 2009, significant progress has been made in collecting granular data on derivatives as part of internationally coordinated efforts to enhance transparency of this market.[182] In Europe, the introduction of the European Market Infrastructure Regulation (EMIR) enabled EU authorities to improve their oversight of derivatives users and their activities.[183] Building on the data collected under EMIR, this case study looks at the use of CDS in Europe, with a special focus on non-bank financial entities in general and investment funds, in particular. Section 5.5.1 covers entities domiciled in the euro area and the Section 5.5.2 covers mutual funds in the EU regulated under the Undertakings for Collective Investment in Transferable Securities (UCITS) directive.

5.5.1 Market structure and non-banks in the euro area CDS market

Euro area CDS gross notional exposures and net risk buyers/sellers by sector — Exhibit 5-9



[1] Shows aggregated CDS gross notional where either one of the counterparties or the reference entities is domiciled in the euro area. CCPs are not shown in the graph as a separate sector, but trades of other sectors with a CCP are included in the sample. Intra-group positions are treated in the same way as positions between unrelated entities. Banks = either commercial or investment banks other than the group of G16 dealers; Inv. firms = financial services providers in securities and derivatives markets, including non-G16 dealers; Inv. funds = the sum of Alternative funds, UCITS funds and remaining funds and asset managers that cannot be classified by type of fund.; OFI = financial institutions not previously identified, including SPVs; Unspec. = unspecified.

Sources: ECB calculations on euro-area EMIR data (31st May 2018).

In the euro area, non-banks, such as investment funds, investment firms, insurance corporations and pension funds (ICPF), and OFIs[184] have a combined market share of about 19% (Exhibit 5-9 LHS).[185] In the euro area, investment funds are the largest sector among

[181] This case study was prepared by Claudia Guagliano, Julien Mazzacurati (ESMA), Francesca Lenoci and Christian Weistroffer (ECB).

[182] At the Pittsburgh Summit in 2009, the G20 leaders pledged to reform the derivatives markets to increase transparency, mitigate systemic risk, and protect against market abuse.

[183] See Abad et al (2016).

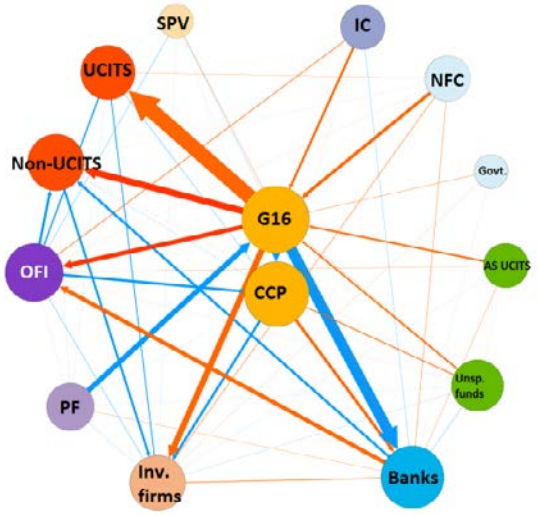
[184] Unlike the rest of the Report, the definition for OFIs used in the case study excludes all known subsectors mentioned in Exhibit 5-9, LHS and CCPs.

[185] The market shares are based on a total amount adding the GNE of all the sectors shown in Exhibit 5-9 LHS.

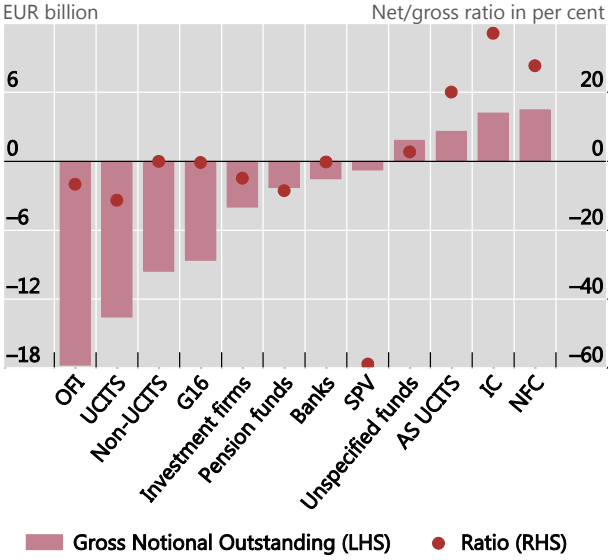
non-banks in terms of CDS exposures, holding roughly €480 billion out of €5.3 trillion of total gross notional exposure (GNE) in May 2018. Among euro area investment funds using CDS, about 34% of CDS gross notional amounts are bought or sold by UCITS funds, 49% by non-UCITS or alternative funds and 17% are reported by asset managers which cannot be further classified by counterparty type.[186] In the euro area, CDS are mainly written on sovereigns and non-financial corporates (Exhibit 5-9, RHS). Euro area OFIs, including special purpose vehicles (SPVs), use a comparably high share of CDS referenced to financial institutions, whereas investment funds tend to use more CDS on sovereigns. For a large share of the market there is no information on the sector of the underlying issuer.

Euro area CDS net risk buyers and sellers, by counterparty sector — Exhibit 5-10

Network structure of the euro area CDS market[1]



Net notional outstanding[2]



Netting refers to the difference between CDS gross notional bought and gross notional sold at sector level. The net position at sector level does not take into account possible netting sets from a risk perspective, ie distinguishing between reference securities and maturities. [1] Node size proxies the gross notional outstanding and the thickness of the edge shows the net notional exchanged between two counterparties. Orange (blue) edges stand for "buy" ("sell") position, while the arrows show the direction of the flow. AS UCITS = UCITS funds pursuing alternative strategies; IC = insurance companies; PF = pension funds. [2] The ratio is computed as (notional bought - notional sold) / (notional bought + notional sold). The measure does not consider the extent to which buy and sell positions off-set each other from a risk perspective.

Sources: ECB calculations on euro-area EMIR data (31st May 2018).

The euro-area CDS market resembles a bow-tie network structure,[187] with a high degree of intra-dealer gross exposures at the centre of the network (Exhibit 5-10, LHS). Typically, in the euro area, dealers maintain a matched-book with buying and selling positions offsetting each other, while non-banks are observed on either side of the market. The network also illustrates that, CCPs play a significant role in euro area CDS markets, with a growing share of centrally-cleared transactions, as the clearing obligation under EMIR entered into force.[188]

[186] Further data sources have been used (ie RIAD, Lipper IM) to complement the EMIR reports. Alternative investment funds are captured by the category of n*on-UCITS.* Unspecified funds include cases where the asset manager (rather than the managed fund) has been reported as counterparty to a trade.

[187] See D'Errico et al (2018).

[188] See ESMA (2018).

Exhibit 5-10 (RHS) shows that while non-UCITS funds maintain a larger GNE to CDS than UCITs funds (one and a half), both types of funds sell more CDS protection than they buy protection. SPVs have comparably low notional exposures overall, but show relatively large directional exposure as net seller of protection.[189] Insurance companies tend to be net buyers of protection while pension funds are net sellers of protection. The role of the large G16 dealers[190] as intermediaries between net protection buyers and sellers, in the euro area, is also reflected in the ratio of net-to-gross notional being close to zero (Exhibit 5-10, RHS). In their role as market makers and clearing members, these G16 dealers typically maintain a low net risk exposure.

5.2.2 Focus on UCITS: The use of CDS by mutual funds in the EU

UCITS funds represent about 60% of the EU fund market. Although UCITS funds make up a relatively small portion of the overall CDS market in the EU, they account for a significant share of the positional trades among non-banks. While a large part of this sector does not use derivatives, some types of funds rely on CDS for their strategies. The selling of CDS protection, in particular, enables funds to gain exposure to contingent credit risk, if the exposures remain unhedged.[191] CDS may also be the preferred alternative to transacting in the underlying bond market, which may be less liquid than the CDS market.[192]

Out of the roughly one million CDS transactions with a gross notional amount of €11.9 trillion, less than 5% of CDS transactions involved a UCITS fund.[193] About 7% of the overall UCITS funds sample use CDS,[194] which accounts for 17% in terms of NAV of the total sample. The share of UCITS funds using CDS is particularly high for fixed income and alternative funds, with respectively 20% and 15% of funds in the sample identified as a counterparty to at least one CDS contract (around 40% of NAV; see Exhibit 5-11, LHS).[195]

UCITS fixed income and mixed funds are on average net sellers of protection, while UCITS funds using alternative strategies are net buyers of protection (Exhibit 5-12, LHS). UCITS funds using alternative strategies are particularly active users of CDS amongst the different fund categories, with the median value of relative CDS gross notional exposure at 44% of NAV, which is higher than for fixed income funds (20%) and the sample of CDS users as a whole (12%).[196] The relative gross exposure – calculated as GNE as a percentage of NAV – indicates how large a fund's gross CDS exposure is relative to its equity position. Since this measure ignores hedging and netting arrangements, as well as mark-to-market values, it is not indicative of individual fund risk exposure. However, it does provide a sense of UCITS funds' activity in CDS markets. Exhibit 5-11, RHS, shows that about 9% (114 funds) of the

---

189 For evidence on the Irish market, see Moloney et al (2016).

190 The group of 16 (G16) dealers includes large securities and derivatives dealers operating globally.

191 Leverage is restricted under the UCITS Directive by the commitment or VaR approach.

192 See Jiang and Zhu (2016).

193 Gross notional amounts might underestimate the market share of UCITS funds compared to a net measure.

194 There are 1,300 funds using CDS out of a sample of 18,600. According to ESMA, there are more than 29,000 UCITS funds in the EU (See ESMA (2017)).

195 This is also in line with figures for the US, where alternative funds have a much greater propensity to use derivatives than other types of mutual funds. See Deli et al (2015).

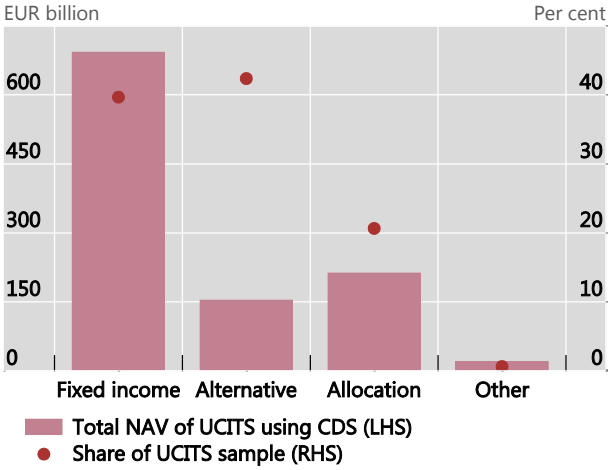
196 See Guagliano and Mazzacurati (2018).

UCITS funds in the sample have relative CDS gross notional exposure larger than 150%.

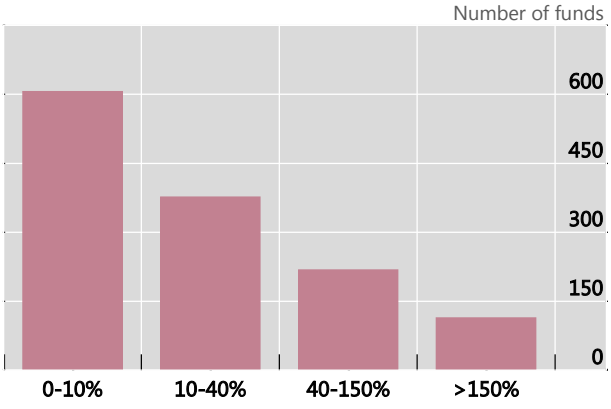
Use of CDS by UCITS investment funds

Exhibit 5-11

Net assets of funds using CDS and share of funds in each category[1]



Number of funds by level of relative gross exposure from CDS[2]



[1] Shows the aggregate net assets (NAV) of UCITS funds using CDS (LHS) by fund type, and the share of funds using CDS as a % of funds within each category (RHS). Based on a sample accounting for around two-thirds of all UCITS funds, with total NAV of €6.3 trillion. [2] Shows the number of UCITS funds using CDS split into four buckets corresponding to different levels of relative gross CDS exposure.

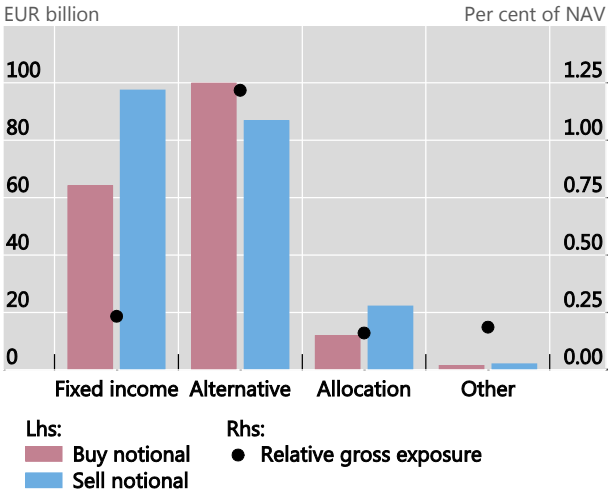
Source: ESMA calculations on EMIR data (1st December 2016).

Multi-name CDS (almost exclusively index CDS) accounted for about 70% of gross CDS notional. The use of single-name CDS by UCITS funds amounted to a gross CDS notional amount of nearly €100 billion, with 60% on the sell side – ie exposing the funds to the underlying credit risk (Exhibit 5-12 RHS). The amount of sell-side single-name CDS notional exposure was particularly high for fixed-income funds, at €40 billion.

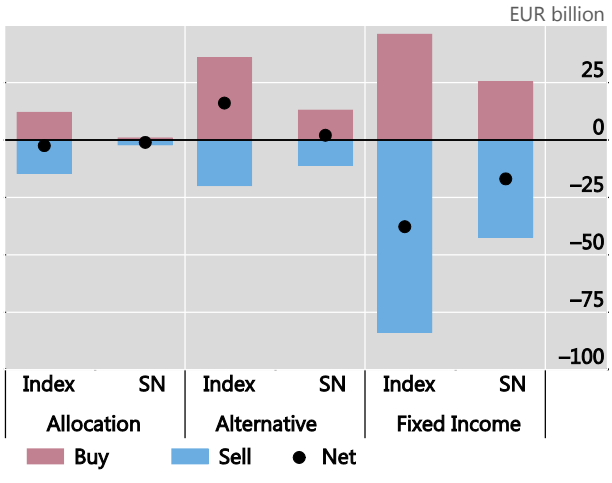
Use of CDS by UCITS investment funds

Exhibit 5-12

Gross CDS notional outstanding[1]



Gross and net CDS notional outstanding by fund type and underlying[2]



[1] Shows gross CDS notional outstanding of UCITS funds using CDS, by fund type and buy versus sell CDS positions (LHS) and relative gross exposure (RHS). [2] Shows gross CDS notional outstanding of UCITS funds using CDS, split between index and single-name CDS. The chart also shows the net position (the difference between buy CDS notional and sell CDS notional, by fund type and underlying).

Source: ESMA calculations on EMIR data (1st December 2016).

Annex 1: Summary table

Moving from MUNFI to the narrow measure

29-Group, in USD trillion

	MUNFI	MUNFI components				Excluded from narrow measure[1]	Narrow measure of NBFI	Narrow measure components (by economic function (EF))					
		ICs	PFs	OFIs	FAs			EF1	EF2	EF3	EF4	EF5	Unallocated
2006	91.4	19.6	19.0	51.7	1.1	63.8	27.6	11.5	3.1	6.9	0.1	5.5	0.6
2007	103.3	20.5	20.0	61.6	1.2	70.5	328	14.0	3.3	7.8	0.1	6.7	0.9
2008	100.6	19.2	18.7	61.6	1.2	68.0	32.6	14.2	3.6	6.2	0.1	6.8	1.7
2009	106.5	20.8	20.4	63.8	1.5	76.1	30.4	14.9	3.3	4.0	0.2	6.6	1.3
2010	114.6	22.3	22.4	68.3	1.7	85.1	29.5	15.9	3.4	3.5	0.2	5.2	1.2
2011	118.7	23.1	23.4	70.6	1.7	87.5	31.2	18.1	3.4	3.7	0.2	4.4	1.3
2012	128.8	24.8	25.2	77.1	1.8	94.5	34.3	21.7	2.9	3.8	0.2	4.3	1.3
2013	139.1	26.0	27.0	84.3	1.8	101.9	37.2	24.7	2.9	3.9	0.2	4.3	1.2
2014	152.8	28.0	28.7	94.2	1.9	111.9	40.9	27.7	3.1	4.3	0.2	4.4	1.3
2015	160.7	28.9	29.5	100.3	1.9	116.7	44.0	30.6	3.1	4.1	0.2	4.5	1.5
2016	172.7	30.5	31.4	108.8	2.1	125.3	47.5	33.6	3.3	4.0	0.2	4.5	1.9
2017	185.0	32.0	33.6	117.0	2.3	133.4	51.6	36.7	3.5	4.2	0.2	5.0	2.0

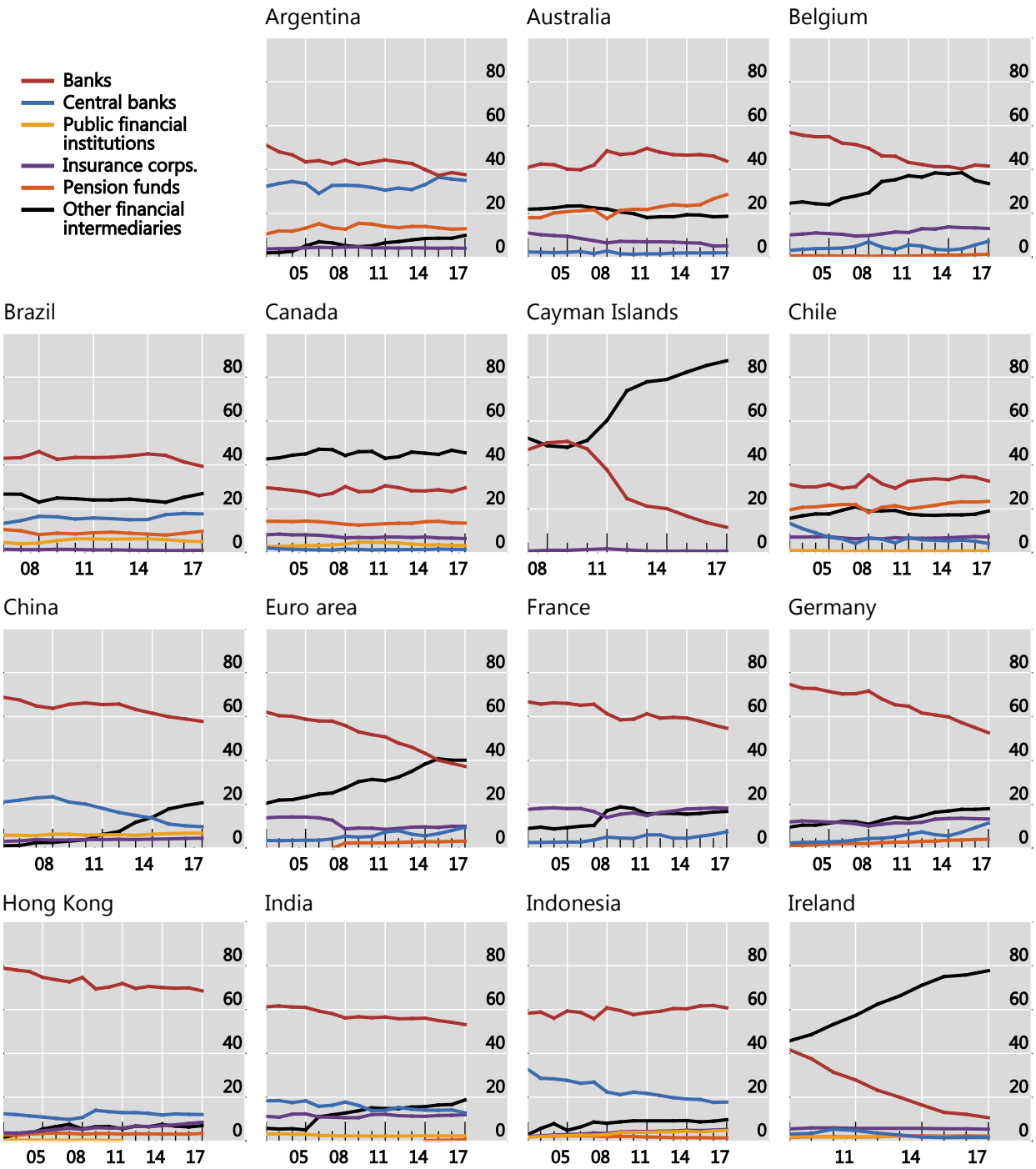
MUNFI = Monitoring universe of non-bank financial intermediation; ICs = Insurance corporations; PFs = Pension funds; OFIs = Other financial intermediaries; FAs = Financial auxiliaries; Unallocated = included in narrow measure but not allocated to a particular EF. Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). [1] Includes MUNFI entities classified outside the narrow measure, prudentially consolidated into banking groups, or that are part of the statistical residual (see Section 4.1).

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Annex 2: Jurisdiction-specific summaries

Share of total national financial assets by jurisdiction

In per cent[1] Exhibit A2-1

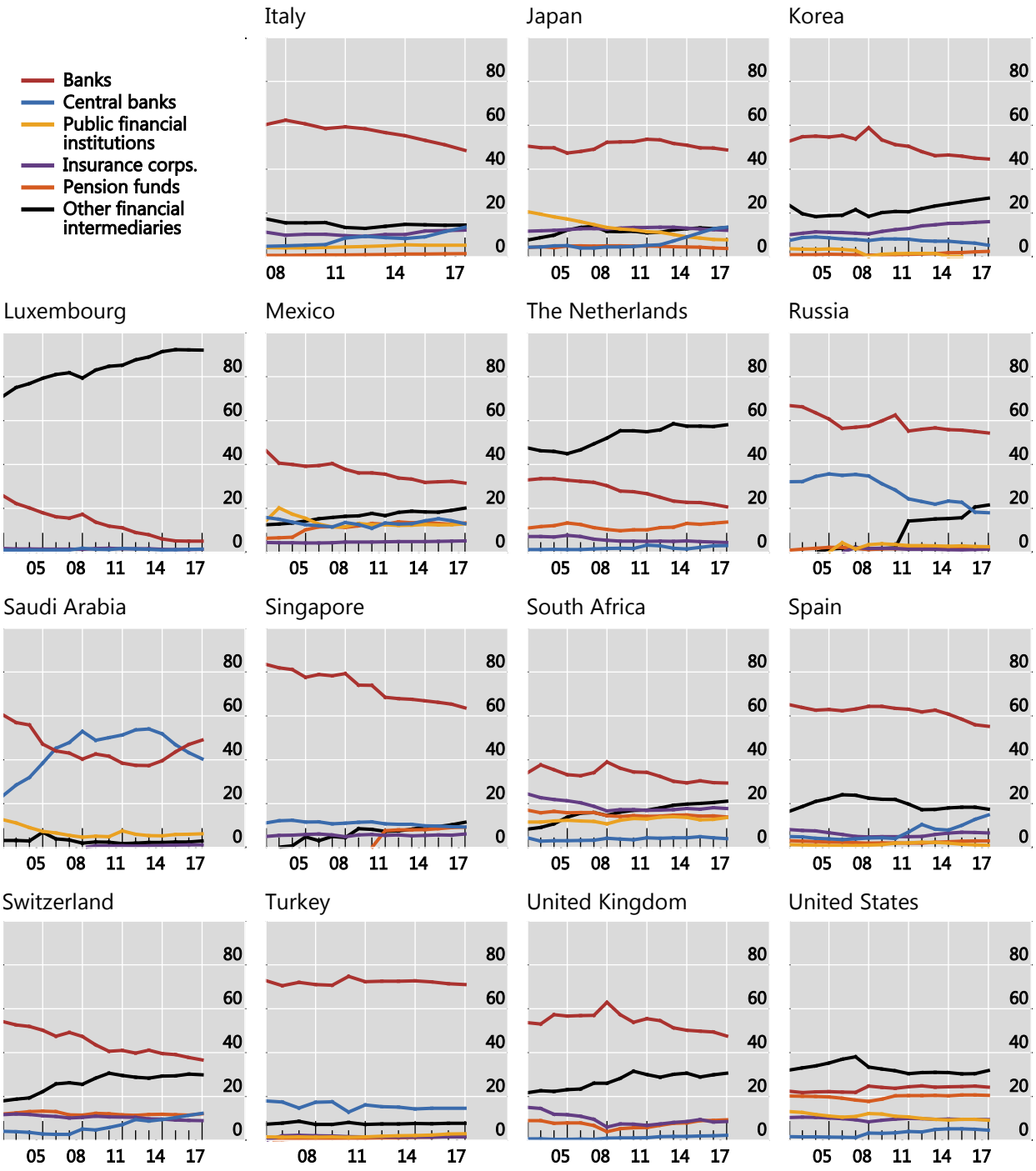


[1] Based on historical data included in jurisdictions' 2018 submissions. Some exchange rate effects have been netted out by using a constant exchange rate (from 2017).

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Share of total national financial assets by jurisdiction

In per cent[1] Exhibit A2-2



[1] Based on historical data included in jurisdictions' 2018 submissions. Some exchange rate effects have been netted out by using a constant exchange rate (from 2017).

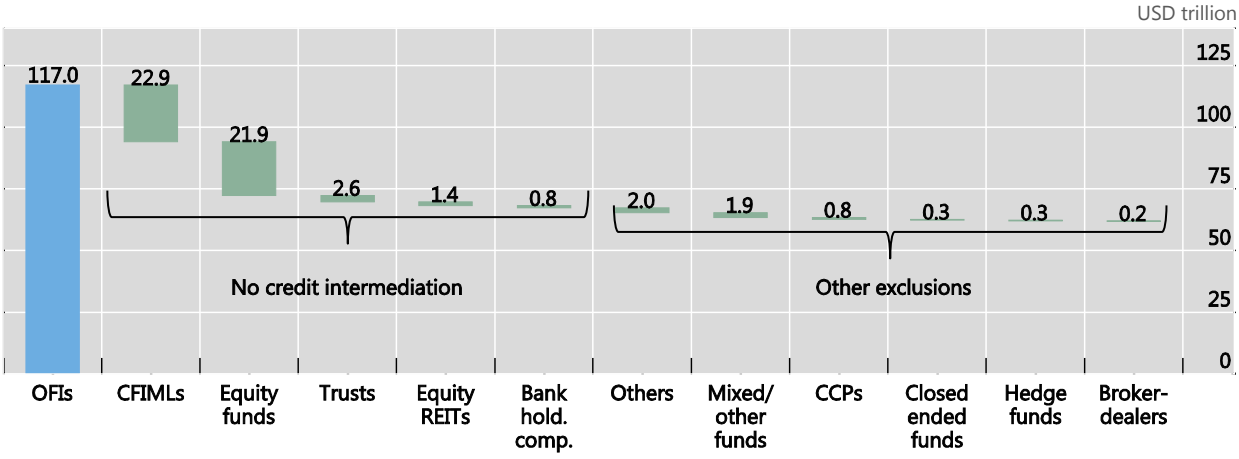
Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

Annex 3: Exclusion of OFI entity types from the narrow measure of NBFI

The FSB's monitoring methodology allows for excluding from the narrow measure, entities included in MUNFI that either do not engage in significant credit intermediation, or engage in credit intermediation but were prudentially consolidated into a banking group. Accordingly, for the 2018 monitoring exercise (ie data as of end-2017), authorities performed a classification assessment and a series of mutual reviews to arrive at the narrow measure, and excluded $55.3 trillion of OFI assets (47%) that were included in the MUNFI measure. This Annex provides a breakdown of those non-bank entity types that were excluded from the narrow measure and the reasons for exclusion.

Exclusion of OFI entity types from the narrow measure

29-Group at end-2017 Exhibit A3-1



Equity REITs = real estate investment trusts and RE funds; Bank hold. comp. = bank holding companies; Others = a group of small OFI entity types that are mostly jurisdiction-specific (see discussion below).

Sources: Jurisdictions' 2018 submissions (national sectoral balance sheet and other data); FSB calculations.

- **Captive financial institutions and money lenders (CFIMLs)** are either: (i) part of non-financial corporations and used for the pass-through of capital; or (ii) consolidated into banks and thus excluded from the narrow measure.
- **Equity funds** invest principally in equity securities, and are not involved in credit intermediation. Equity funds and ETFs referencing equity indices that do not hold more than 20% of their AUM in credit-related assets are excluded from the narrow measure. These funds often hold a modest amount of cash and highly liquid fixed income assets for cash management purposes.
- **Trust companies** exist in several jurisdictions. In Singapore and South Africa, they provide a range of administrative and advisory services to individual clients, but are not CIVs. Korean trust accounts are separately managed (not CIVs) and closed-ended with limited leverage. Mexican trust companies that were not classified in the narrow measure invest mainly in equities of non-listed companies and infrastructure projects. Several types of Chinese trusts were excluded from the narrow measure including property trusts (which can only invest in non-financial assets), some non-bank-

affiliated single money trusts and collective investment trusts (unlevered, closed-ended and/or invest primarily in equity assets).

- **Equity REITs** and real estate funds that invest into equities or directly in real estate have been excluded from the narrow measure as they do not engage in credit intermediation (in contrast with mortgage REITs).
- **Bank holding companies** in the UK are a part of prudentially regulated banking entities and hence are not classified into the narrow measure.
- **Others** consist of relatively small OFI entity types, including: the European Financial Stability Facility (Luxembourg); non-securitisation or publicly issued SPVs (Ireland, Brazil, Korea), microfinance entities and peer-to-peer lenders (China); venture capital and private equity entities that are not, or are only marginally, engaged in credit intermediation (Belgium, Indonesia, Italy, Mexico, Spain and Turkey); central mortgage bond institution (Switzerland); Brazilian raffle savings companies; Indian self-help group loans; and Stokvels (informal savings clubs in South Africa).
- **Mixed/other funds** in Brazil, France, Hong Kong, India, Indonesia, Ireland, Korea, Luxembourg, the Netherlands and Turkey were assessed to be either not engaged in material credit intermediation, or presenting only negligible liquidity and maturity transformation risks and with immaterial leverage, or are not CIVs. For example, Discretionary Funds in Indonesia have been assessed not to be CIVs as they are separately managed and invest mostly in equities. South Africa did not classify funds of funds in the narrow measure since the underlying fund is invested in equities.
- **CCPs** were excluded from the narrow measure due to the absence of credit intermediation. With both sides of the balance sheet typically matched, CCPs are not engaged in bank-like activities such as leverage or liquidity/maturity transformation. However, their collateral management activities may involve elements of liquidity/ maturity transformation.
- **Closed-ended funds** with limited maturity/liquidity transformation, and that are not leveraged, are not considered susceptible to runs in the same way that open-ended funds are, and have generally not been classified in the narrow measure unless a jurisdiction chose to include them following a conservative approach.
- Certain **broker-dealers** in some jurisdictions (Belgium, Hong Kong, Indonesia, Ireland, Korea, and the Netherlands) were excluded from the narrow measure as these entities are not engaged in credit intermediation (ie they act as “pure” brokers/agents for clients).
- **Finance companies** in Indonesia and India whose short-term funding is less than 10% of overall assets, as well as finance companies in China that provide internal financing and serve more as a treasury function, were not classified in the narrow measure.
- Certain **hedge funds** in Canada, India, and Ireland that largely do not engage in credit intermediation are excluded from the narrow measure. A small portion of hedge funds in Luxembourg was excluded from the narrow measure as they are closed-ended and employ little or no leverage, and thus were assessed to not pose significant financial stability risks from NBFI.

Annex 4: Bibliography

Abad, J, I Adasoro, C Aymanns, M D'Errico, L Rousová, P Hoffmann, S Langfield, M Neychev, and T Roukny (2016): "Shedding light on dark markets: First insights from the new EU-wide OTC derivatives dataset", *ESRB Occasional Paper*, no 11, September.

Aldasoro, I and T Ehlers (2018): "The credit default swap market: what a difference a decade makes", *BIS Quarterly Review*, June.

Asia Securities Industry and Financial Markets and International Capital Market Association (2017): *A pilot survey of the Asia-Pacific repo market*, September.

Bank for International Settlements and Financial Stability Board (2018): *Securities Financing Transactions: Reporting Guidelines*, March.

BIS (2018): *Long Series on Total Credit and Domestic Bank Credit to the Private Nonfinancial Sector*, September.

BIS (2018): "The rise of leveraged loans: a risky resurgence?", *BIS Quarterly Review*. September.

Bank of England and the Procyclicality Working Group (2014): *Pro-cyclicality and structural trends in investment allocation by insurance companies and pension funds*, July.

Bank of England (2018): *Financial Stability Report*, Issue No. 44. November.

Basel Committee on Banking Supervision (2013): *Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools*, January.

BCBS (2018): *Sound Practices: implications of fintech developments for banks and bank supervisors*, February.

Borio, C and P Lowe (2002): "Assessing the risk of banking crises", *BIS Quarterly Review*, December.

Braunsteffer et al (forthcoming): "The use of CDS by UCITS investment funds – Evidence from regulatory data", *ESRB Working Paper*.

Bruno, V and H S Shin (2015): "Cross-border banking and global liquidity", *Review of Economic Studies*, vol 82, issue 2, April.

Christiano, L and T Fitzgerald (2003): "The band-pass filter", *International Economic Review*, vol 44, issue 2, May.

Claessens, S, J Frost, G Turner, and F Zhu (2018): *FinTech credit markets around the world: size, drivers and policy issues*, *BIS Quarterly Review*, September.

Committee on the Global Financial System and FSB (2017): *FinTech credit: Market Structure, business models and financial stability implications*, May.

Cyree, K B, J W Wansley, and T P Boehm (2000): "Determinants of bank growth choice", *Journal of Banking and Finance*, vol 24, issue 5, May.

D'Errico, M, S Battiston, T Peltonen, and M Scheicher (2018): "How does risk flow in the credit default swap market?", *Journal of Financial Stability*, vol 35, April.

Dembiermont, C, M Drehmann, and S Muksakunratana (2013): "How Much Does the Private Sector Really Borrow? A New Database for Total Credit to the Private Non-Financial Sector", *BIS Quarterly Review*, March.

Deli, D, P Hanouna, C Stahel, Y Tang, and W Yost (2015): "Use of derivatives by registered investment companies", *US Securities and Exchange Commission white paper*, December.

Executives' Meeting of East Asia-Pacific Central Banks (2018): *EMEAP Money Markets: Survey Report*, August.

European Central Bank (2015): *ECB Economic Bulletin,* issue 2, March.

ECB (2018a): *Financial Stability Review*, May.

ECB (2018b): *Financial Stability Review*, November.

European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, and World Bank (2009): *System of National Accounts 2008*, September.

European Securities and Markets Authority (2017): "Opinion: Share classes of UCITS", 30 January.

ESMA (2018): *ESMA Annual Statistical Report: EU Derivatives Markets*, October.

Euromoney (2018): "Are CLO managers getting away with murder?", November.

Eurostat (2013): *European System of Accounts: ESA 2010*, June.

Federal Reserve Board of Governors (2018): *Financial Stability Report*. November.

Financial Stability Board (2011): *Shadow Banking: Strengthening Oversight and Regulation*, October.

FSB (2013): *Strengthening Oversight and Regulation of Shadow Banking: Policy Framework for Strengthening Oversight and Regulation of Shadow Banking Entities*, August.

FSB (2014): *Global Shadow Banking Monitoring Report 2014*, October.

FSB (2017a): *Policy Recommendations to Address Structural Vulnerabilities from Asset Management Activities*, January.

FSB (2017b): *Global Shadow Banking Monitoring Report 2016*, May.

FSB (2017c): *Assessment of shadow banking activities, risks, and the adequacy of post-crisis policy tools to address financial stability concerns*, July.

FSB (2018a): *Global Shadow Banking Monitoring Report 2017*, March.

FSB (2018b): *Crypto-assets: Report to the G20 on work by the FSB and standard-setting bodies*, July.

FSB (2018c): *Crypto-asset markets: Potential channels for future financial stability implications*, October.

FSB (2018d): "FSB reviews financial vulnerabilities and deliverables for G20 Summit", 22 October.

Fitch Ratings (2016): "European Leveraged Loan Funds", October.

Fong, T, A Sze, and E Ho (2018): "Assessing the interconnectedness between cross-border shadow banking systems", *HKIMR Working Paper*, no 05.

Forbes, K and F Warnock (2012): "Capital flow waves: Surges, stops, flight, and retrenchment", *Journal of International Economics*, vol 88, no 2.

Giuzio, M and G Nicoletti (2018): "Integrating euro area corporate bond markets: benefits and potential financial stability challenges", *ECB Financial integration in Europe*, May

Guagliano, C and J Mazzacurati (2018): "Drivers of CDS usage by EU investment funds", *ESMA Report on Trends, Risks and Vulnerabilities,* no 2, September.

Habib, M, and L Stracca (2012): "Getting Beyond Carry Trade: What Makes a Safe Haven Currency?", *Journal of International Economics,* vol 87.

International Monetary Fund (2014): "Shadow banking around the globe: How large, and how risky?", *Global Financial Stability Report*, October.

IMF (2018): *Global Financial Stability Report*, October.

International Organisation of Securities Commissions (2017): *Report on the Fourth IOSCO Hedge Funds Survey*, November.

IOSCO (2018): *Leverage: Consultation Paper*, November.

Jiang, W and Z Zhu (2016): "Mutual Fund Holdings of Credit Default Swaps: Liquidity, Yield, and Risk Taking", *Columbia Business School Research Paper*, no 15-9.

Kara, G, M Tian, and M Yellen (2015): "Taxonomy of Studies on Interconnectedness", *FEDS Notes*, July.

Kemp, E, R Van Stralen, A Vardoulakis, and P Wierts (2018): "The Non-Bank Credit Cycle", *FEDS Working Paper* 2018-076, October.

Kenny, O, N Killeen and K Moloney (2016): "Network analysis using EMIR credit default swap data: micro-level evidence from Irish-domiciled special purpose vehicles (SPVs)", *IFC Bulletins*, no 41.

Laeven, L and F Valencia (2012): "Systemic banking crises database: an update", *IMF Working Paper* 12/163, June.

Longstaff, F, J Pan, L Pedersen, and K Singleton (2011): "How Sovereign Is Sovereign Credit Risk?", *American Economic Journal: Macroeconomics*, vol 3, no 2, April.

Moody's (2018a): "High corporate leverage signals future credit stress even as the default rate remains very low", 24 May.

Moody's (2018b): "EBITDA adjustments on the rise but fewer will be achieved", 27 June.

Moody's (2018c): "Leveraged Finance – US: LBO credit quality is weak, bodes ill for next downturn", 18 October.

Office for National Statistics (2018): "Economic Statistics Transformation Programme: enhanced financial accounts (UK flow of funds) – Financial Services Survey 266 – quarterly return of assets and liabilities", June.

Office of Financial Research (2018): *Annual Report to Congress 2018*, November.

Organisation for Economic Co-operation and Development (2010): *Pensions Markets in Focus*, July.

OECD (2018): *Pension Markets in Focus*, October.

Papaioannou, M, J Park, J Pihlman, and H van der Hoorn (2013): "Procyclical behavior of institutional investors during the recent financial crisis: causes, impacts, and challenges", *IMF Working Paper*, WP/13/193, September.

Reserve Bank of India (2017): "Non-Banking Finance Companies in India's Financial Landscape", 10 October.

Rey, H (2018): "Dilemma not Trilemma: The global financial cycle and monetary policy independence", *NBER Working Paper*, no 21162, February.

Schaumburg, J, I van Lelyveld and D Wang (2018): "Dynamic portfolio overlap networks, contagion and the credit spread puzzle", January.

Schularick, M and A Taylor (2012): "Credit booms gone bust: Monetary policy, leverage cycles, and financial crises, 1870-2008", *American Economic Review*, vol 102, no 2.

Standard & Poors (2018): "When the cycle turns: leverage continues to climb: has it finally peaked?", 9 October.

United Nations and ECB (2014): *Financial Production, Flows and Stock in the System of National Accounts*, July.